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for

Physicians and Surgeons in Industry

Volume 2 NOVEMBER, 1933 Number 5

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CONTENTS

Volume 2 **November, 1933** **Number 5**

Voluntary Group Hospitalization, by William H. Walsh, M.D., F.A.C.P. 273

—As Applied to the Industrial Worker—

Traumatic Neurosis 278

Workmen's Compensation Costs in England 278

Workmen's Compensation, by Thurman H. Lautenschlager, M.D., LL. B. 279

Cancer and Occupation 286

Conference on Silicosis 286

Cardiovascular Disease and Industry, by Nathan Smith Davis, III, A.B., M.D., F.A.C.P. 287

—Chapter II. Rheumatic Heart Disease; and Chapter III. Syphilitic Heart Disease—

The Effects of War Gases 289

Medical Economics 289

Medical and Surgical Fees, by I. S. Trostler, M.D., F.A.C.R., F.A.C.P. 290

—In Which the Conclusion is Sustained that Neither Industrial Commission Nor Insurance Companies Have Any Authority to Fix Them—

Medical Costs 296

Improvement in Roentgenographic Technic 296

Industrial Eye Accidents in Canada 296

Editorial:

Dust Standards 297

Letters to the Editor:

"Bringing Medicine Out of Chaos" 297

Industrial Medicine Digest:

—**Excretion of Lead, Drs.** Fredrick B. Flinn and Adelaide Ross Smith, *Journal of Industrial Hygiene* 299

Absenteeism,
Accident—
Costs,
Hazards,
Prevention,
Records,
Acids,
Administrative Problems,
Advisory Services,
Age,
Air Conditioning,
Allergy,
Amputations,
Anesthetics,
Antiseptics,
Apparatus,
Athletics,
Awards,
Bacterial Infections,
Baths,
Benefits,
Biological Tests,
Biology,
Chemicals,
Chemistry,
Children in Industry,
Claims,
Classification of Results,
Clinics—
Dental,
Medical,
Clothing Hazards,
Community Services,
Compensation,
Compensation, Insurance—
Costs,
Forms,
Records,
Consultation,
Convalescent Homes,
Cooperative Units,
Court Decisions,
Degenerates,
Dental Service,
Dependency,
Diagnosis,
Diagnostic Tests,
Diet,
Disabilities,
Disease Prevention,
Disfigurement,
Disinfection,
Dispensaries—
Costs,
Forms,
Records,
Dressings,
Drugs,
Dust Control,
Economics,
Electrotherapy,
Emergencies,
Employee—
Environment,
Examinations,
Hazards,
Insurance,
Placement,
Welfare,
Employer—
Costs,
Liabilities,
Responsibilities,
Employment,
Epidemics,
Epidemiology,
Estoppels,
Ethics,
Examination—
Costs,
Forms,
Records,
Executive Examinations,
Expert Testimony,
Extra-Medical Activities,
Eye Tests,
Fatigue,
Female Employee Problems,
First Aid—
Equipment,
Instruction,
Frequency Rates,
Fumes,
Functional Tests,
Gases,
Grading Applicants,
Gymnasium,
Habits,
Health—
Education,
Maintenance,
Surveys,
Heating,
Heliotherapy,
Hospital—
Costs,
Equipment,
Forms,
Records,
Hospitalization,
Hours,
Hydrotherapy,
Idiosyncrasies,
Impairments,
Industrial—
Accidents,
Clinics,
Commissions,
Dentistry,
Diseases,
Gynecology,
Hospitals,
Hygiene,
Injuries,
Medical Service,
Medicine,
Neuroses,

—**Financial Losses and Mental Illness,** Dr. William C. Menninger and Leona Chidester, *Journal of The American Medical Association* 299

—**Carbon Monoxide Poisoning—Case Report**, Dr. Milton A. Bell, *Journal of The American Medical Association* 299

—**Fractures of the Humerus,** Drs. William R. Cubbins and Carlo S. Scuderi, *Journal of the American Medical Association* 300

—**Industrial Surgery,** Dr. R. F. Palmer, *Southwestern Medicine* 300

—**Lead in Air of Streets and Shops,** J. J. Bloomfield and H. S. Isbell, *Journal of Industrial Hygiene* 301

—**Toxicity of Osmium Tetroxide**, Dr. F. R. Brunot, *Journal of Industrial Hygiene* 301

—**Fractures of the Femur,** Dr. J. H. Dorman, *Texas State Journal of Medicine* 301

The Bulletin of The American Association of Industrial Physicians and Surgeons, Volney S. Cheney, M.D., Editor 302

Tuberculosis and Dust, by Dr. Henry R. M. Landis ... 302

Discussion 304

The Industrial Doctor, Official Journal of the New York State Society of Industrial Medicine, Frank E. Redmond, Managing Editor 306

Annual Meeting 307

Treating Chronic Osteomyelitis with Special Reference to the Use of the Larvae of Blow-flies, by Edward T. Wentworth, A.B., M.D., F.A.C.S. 307

Central States Society of Industrial Medicine and Surgery:

The Influence of Parathyroid on Traumatic Conditions, .. by Dr. Don Deal and Dr. G. W. Stabens 314

Discussion 315

Industrial Medicine News:

Occupational Disease Experience in Ohio During 1932 . 315

Examination of Automobile Drivers 316

Cumulative Index 316

This magazine is published to promote sound thought upon and concerning industrial medicine. To that end it will contain articles, news items, reports, digests and other presentations, together with editors' comments. The editorial policy is to encourage frank discussion. On this basis contributions are invited. The editors will exercise care in checking on the accuracy of data printed, but in all other respects articles and opinions of which expression is allowed are the articles and opinions of their authors—the editors reserving in all cases the right to comment on the same, in the current or any subsequent issues, as they may be inclined.

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Infection,
Inoculation,
Insurance—
Casualty,
Compensation,
Disability,
Health,
Life,
Policies,
Records,
Job Analysis,
Laboratories,
Law,
Legal Medicine,
Legal Procedure,
Life Extension,
Lighting,
Lost Time Accidents,
Malingering,
Malpractice,
Medical—
Books and Publications
Corporations,
Costs,
Economics,
Equipment,
Ethics,
Examinations,
Forms,
Jurisprudence,
Personnel,
Records,
Service,
Sociology,
Supervision,
Supplies,
Medical Department—
Costs,
Functions,
Standards,
Mental—
Disability,
Hygiene,
Metabolism,
Mutual Aid Societies,
Mutual Benefit Associations,
Neuroses,
Noise Elimination,
Nurses—
Industrial,
Part-time,
Practical,
Visiting,
Nursing Organizations,
Occupational—
Accidents,
Diseases,
Hazards,
Injuries,
Poisons,
Operative Surgery,
Ophthalmology,
Oral Hygiene,
Orthopedic Surgery,
Oral Work,
Patent Medicines,
Pathology,
Personal Injuries,
Physical—
Examinations,
Therapy,
Physicians—
Consulting,
Industrial,
Part-time,
Services,
Physiology,
Plastic Surgery,
Policies, Insurance
Pre-Employment Examinations,
Preventives,
Professional Requirements,
Proprietary Medicines,
Protective Garments,
Psychiatry,
Psychology,
Public Health Agencies,
Reconstructive Surgery,
Recreation,
Re-Dressings,
Re-Examinations,
Rehabilitation,
Relations with Private Practice,
Remedial Agencies,
Research,
Respirators,
Rest,
Restaurants,
Resuscitation,
Roentgenology,
Routine Examinations,
Sanitariums,
Sanitation,
Scars,
Seating,
Serotherapy,
Serums,
Severity Rates,
Sick Benefits,
Specialists,
Special Services,
Staff Organization,
State—
Boards, Functions,
Laws,
Medicine,
Supervision,
Statistics,
Superannuation,
Surgery,
Symptoms,
Temperature,
Terminology,
Tests,
Therapeutics,
Toxicology,
Traumatic Surgery,
Treatment,
Treatment Procedures,
Unemployables,
Vacations,
Vaccination,
Ventilation,
Visual Tests,
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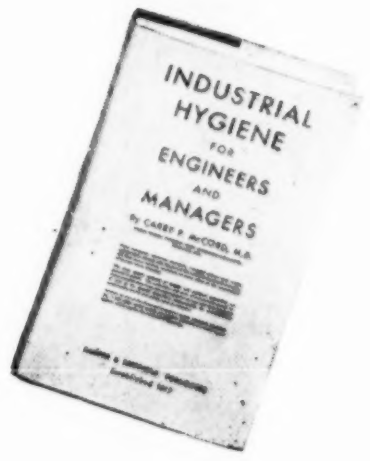

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The Law, the Science and the Economics of Industrial Health

Volume 2 | NOVEMBER, 1933 | Number 5

Voluntary Group Hospitalization

—As Applied to the Industrial Worker—*

by

WILLIAM H. WALSH, M.D., F.A.C.P.
Hospital Consultant
Chicago

THE WIDESPREAD discussion of the movement for the provision of hospital service to employed groups by voluntary prepayment plans has attracted the attention of leaders in industry, and, as a result, information is being sought as to the feasibility and desirability of such plans. In an attempt to clarify the subject it is here proposed to define the activity, indicate its relation to industry, comment upon the attitude of the medical profession toward it, state the legal aspects involved, and then suggest the essentials of a sound and equitable plan.

DEFINITION: A group prepayment plan for hospital service is a plan whereby a hospital or hospitals unite in an agreement to furnish hospital service, if and when needed, at a stated rate and for a definite period, to groups of employed individuals who enroll and voluntarily pay into a fund a subscription to be applied to that purpose. The objective is to reduce the cost of hospital service to those individuals requiring it by spreading the expense over a group of sufficient size to assure a fund adequate to meet predetermined hospitalization demands.

The agreement is made between the hospitals, which control the facilities of service, and the individuals to whom service is to be assured; there should be an intervening agency, the hospitals themselves setting up such additional machinery as may be required to handle the business aspects of the plan; there should be no monetary profit to anyone and the activity should be strictly of a cooperative nature. The fundamental difference between such a plan and the various types of insurance is that in this case, in consideration of the subscription, the hospitals agree to render a specified service on demand, but in no event does there enter the element of pecuniary indemnity which is the basic characteristic of insurance.

INTEREST OF INDUSTRY: The first question that arises in the mind of the employer is the relation, if any, of this movement to the existing workmen's compensation laws. The answer is that there is no direct relation between the two, and those incurring compensable accidents and occupational diseases even though enrolled in a hospitalization plan, will continue to receive the benefits from existing compensation provisions to which they are legally entitled. But in view of the frequent occurrence of borderline cases of occupational disease and the continued exception of many of these disabilities by so many states, any scheme which provides prompt hospitalization to the workman at low cost in cases where liability is in dispute, will be of distinct advantage to industry.

In a study conducted by the Metropolitan Life Insurance Company** a few years ago on the subject of occupational disease, it was shown that in as many as 31 states occupational diseases were specifically excluded from compensation coverage and in only 12 states and three territories had the laws made any adequate provision for such diseases. Under those conditions, which have not changed much since the study mentioned, it is clear that any movement that will aid the workmen when suffering from incapaci-

* Presented at the Washington State Hospital Conference, Seattle, Washington, Nov. 18, 1933.

** History of Workmen's Compensation Laws covering Occupational Diseases, Metropolitan Life Insurance Company, October, 1929.

tating illnesses and personal injuries which are not compensable, or which fall under the controversial aspects of the law, will be beneficial to employee and employer alike.

By reason of the fact that the employee enrolled in a group plan is entitled to hospital service when needed, there is a strong probability that he will seek medical advice in the early stages of illness instead of attempting to continue at work with lowered vitality and impaired alertness.

For the further reason that pay stops during absence from work from disabilities not compensable, there will be an incentive for such workmen to quickly return to work; moreover, since modern hospital contributes to prompt diagnosis and treatment, recovery should be effected in a much shorter time than would be the case if these cases were treated in their homes. Another point of interest to the employer is that subscribers to a hospital fund are enrolled in employed groups, thus affiliation with the hospital fund becomes dependent upon continued employment, thereby furnishing inducement to stick to the job.

LEGAL ASPECTS: It should be obvious that prior to the inauguration of any movement of this character, there are certain legal aspects which require intelligent consideration. Heretofore, too little attention has been given to the relationship, however distant, that exists between group hospitalization plans and insurance, and as might have been expected, widely differing opinions have been rendered by the insurance commissioners of the various states. For example: at the present writing in 20 states it has been more or less definitely decided by the insurance departments that group hospitalization plans come within the scope of the insurance laws or regulations. On the other hand, about an equal number of state insurance departments has given a directly opposite ruling, declaring that these plans do not come within the definition of insurance because they are service agreements and not contracts for pecuniary indemnity. The remaining states have not yet given out final opinions.

Thus, it is evident that in order to establish such plans in about half of the states it will probably be necessary to contest the adverse rulings by taking the matter into the courts, in which case it is altogether likely that in some instances at least the insurance departments' decisions will be reversed. In any event, it would seem wise in all states to formulate enabling legislation which will not only permit these plans to operate outside the insurance regulations, but which should also explicitly define the activity and regulate its operation, thereby protecting the public from the many potential dangers. Certainly it would seem possible to secure the enactment of legislation in most of our states which would so regulate the organization and operation of non-profit group hospitalization plans as to place them beyond the reach of commercial exploitation. If such results ensue we may yet be thankful for the opposition that has been enterposed by the various insurance commissioners.

ATTITUDE OF MEDICAL PROFESSION: Unfortunately, some of the most aggressive advocates of group hospitalization have been organizations and individuals primarily interested in the promotion of schemes for their own profit, with little or no real interest in the ultimate outcome so long as immediate profits were forthcoming. These highly commercialized schemes, predicated upon the diversion of an inordinate proportion of the income to the promoters, have tended to arouse the justifiable opposition of all who are honestly interested in public welfare, but who are unable to distinguish between the commercial and the non-commercial plans. Although a number of state medical societies have approved of the principle underlying group hospitalization plans, many of which are in successful operation in various parts of the country, the attitude of the organized profession tends to be critical and it is therefore essential that contemplated plans be safeguarded against the inclusion of numerous objectionable features which have been pointed out by the Council on Medical Economics of the American Medical Association.

In an endeavor to promote plans for group hospitalization certain individual hospitals, recognizing the possibility of increasing hospital utilization by means of prepayment plans, at a time when bed occupancy was running close to 50%, grasped the rudiments of this idea and commenced operation without competent legal or medical advice, only to learn that because of faults that should have been readily foreseen, the schemes were either unworkable or unacceptable to the local medical group.

For these and other reasons, there exists today a great deal of confusion with respect to the practicability of group payment plans, but that an equitable, sound, and feasible method for spreading the cost of hospital service can be formulated without in any way conflicting with the principles of medical ethics is beyond the question, and in the following pages it is proposed to consider those fundamental factors which must be observed if this movement is to be universally successful.

Essentials of an Acceptable Plan

UNIFIED ACTION BY HOSPITALS: Where two or more hospitals exist in a community, unified action is imperative. The adoption of a group payment plan by a single hospital or small group of

hospitals, excluding other reputable hospitals in the same community, is likely to create a division within the hospital field and the medical profession leading to undesirable competition. It is essential that a plan shall embrace all reputable registered hospitals in the community where such a plan is inaugurated.

NON-COMMERCIAL ADMINISTRATION: To avoid the possibility of the exploitation of such plans by commercial interests and to assure their establishment and administration upon a sound economic basis, it is essential that group plans be controlled and managed by the affiliated hospitals through an unincorporated non-profit agency set up by the hospitals concerned. The formation of a separate corporation as previously advocated by the writer* is now believed to present legal complications and should therefore be avoided. An executive council formed from affiliated hospital trustees with an advisory medical board will probably afford the best type of control.

SCOPE AND SPREAD OF ENROLLMENT: The scope of coverage must be such as to assure reasonably accurate actuarial calculations and there must be a wide enough spread of the group subscriptions so that an excessive morbidity incidence in any one group will not destroy the reserves. The successful operation of a group payment plan is dependent upon the accurate prediction of human events in percentages, it is therefore essential that the size of enrollment be great enough to assure fairly accurate average calculations. An enrollment of about 1500 is the minimum for safety, the hazards increasing rapidly as the number decreases. Operation of the plan should not begin until the enrollment has reached the total agreed upon.

LEGAL COUNSEL: Prior to the inauguration of a plan the legal aspects thereof should be approved by a competent attorney and information should be secured from the state insurance department as to whether or not there is any conflict with the statutes governing insurance.

RESERVE FUND: Safety demands that the annual subscription rate, the per caput diem payment to hospitals, the estimated percentage of beneficiaries, the anticipated number of days of bed occupancy and the administration and organization expenses shall all be so adjusted as to assure the rapid accumulation of an adequate reserve fund for use in meeting extraordinary contingencies and to stabilize the undertaking. Reserves must be so invested as to assure safety and liquidity. Only investments permitted by statute for savings bank funds should be permissible.

PUBLICITY AND PROPAGANDA: The method of organizing subscribers for group payment of hospital service and all propaganda used in connection therewith must remain under the control of the affiliated hospitals and subject to the approval of the local organized medical society, since the hospital service offered is wholly dependent upon the concomitant professional service of the attending physicians.

COST OF SECURING SUBSCRIBERS: At the inception of a group plan the services of experts will be required to aid in the enrollment of subscribers. It will be in the interests of all concerned if the affiliated institutions advance a fund of sufficient amount to meet the preliminary costs covering the printing of literature, the engagement of the experts and other incidental expenses. Those promotional costs apply to the original enrollment only and thereafter this extraordinary expense is eliminated. In contracts with those engaged for organizing purposes there should be no provision for a continuing per caput or renewal commission.

TYPE AND ADEQUACY OF BEDS: The type of accommodations allowed should be ward beds, with the understanding that the subscriber may pay for more privacy if desired. There must be a sufficient number of the type of beds required in the affiliated hospitals to meet the obligations incurred.

EXTENT AND LIMITATION OF SERVICE: The exact hospital service to be rendered and the duration thereof must be clearly stipulated in the plan so that there will be no misunderstanding. The most complete hospital service possible is advisable. Certain types of cases such as insanity, the tuberculous, and those with communicable diseases are ordinarily inadmissible to general hospitals, and therefore may be excluded, but it would be preferable to admit even these cases for limited periods for diagnosis.

CASH REIMBURSEMENT: Since there is always a possibility during the first few years that conditions may arise, such for instance, as prolonged epidemics, floods, and earthquakes causing public disaster, or war conditions—it is considered necessary to make provision in all agreements for the reimbursement of the whole annual payment in the event of conditions arising making it impossible for the fund to provide the hospital service. After the reserve fund is set up this clause may be eliminated.

PROFESSIONAL STANDARDS AND PREROGATIVES: The success of any plan will be dependent upon the degree of cooperation offered by the medical profession. It is therefore desirable that no group payment plan be inaugurated unless or until the complete details thereof have been approved by the local medical society. No plan can be acceptable which adversely affects the ethics of the profession, the standards of scientific service, or the reasonably free choice of physician by the subscriber.

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* Walsh, William H., M. D.: A plan for the Establishment of a Cooperative, Voluntary Hospital Service Fund. *Trained Nurse and Hospital Review*, September, 1933.

MEDICAL ATTENDANCE TO BE SPECIFICALLY EXCLUDED: An acceptable group plan for hospital service alone should specifically exclude any provisions for clinical attendance, this phase of hospital service remaining a matter of individual negotiation between the subscriber and his own physician. X-ray, physical therapy, laboratory and anaesthetic service rendered by physicians may be included in the plan when such services are provided on the order of the attending physician and when the professional heads of these services are engaged by the hospital or otherwise remunerated on an equitable basis.

RELATION OF SUBSCRIBERS TO PHYSICIAN AND HOSPITAL: Subscribers should be admitted to the hospital only upon the recommendation of their own physicians and they should have the widest possible choice of both physician and hospital.

QUALIFICATIONS OF SPECIALISTS: It should be the obligation of all affiliated hospitals, in compliance with modern standards, to require the organized staff to establish reasonable criteria by which the skill, experience and judgment of those desiring to practice the specialties in the hospital should be determined. Those physicians desiring to practice any of the recognized specialties in an affiliated hospital should be certified by the organized staff as proficient in their respective fields.

Combined Hospital and Medical Service

THE GROUP PLAN for non-compensable disabilities thus far described is designed to cover hospital service only, but accumulating evidence of the success of plans in which hospitals service and medical attendance are combined, particularly in large industrial establishments, would seem to place this activity beyond the experimental stage, and therefore, worthy of careful consideration by employers wherever conditions are favorable.

In a comprehensive statistical outline indicating the costs and economic returns from the application of medical service to industry, appearing in the October, 1932, *Industrial Medicine*,* evidence was presented to show the extraordinary benefits both to industry and to the workmen when both hospital service and medical attendance are provided. It was shown that in one industry there resulted reductions in absenteeism of 50.6%, in accident frequency of 43.6%, and in compensation costs of 28.7%. These accomplishments have been approximated, if not exceeded, by the Goodyear, Endicott Johnson, Great Southern Lumber Company, and other industrial groups in widely scattered locations. The economic as well as the social value of medical service in industry has thus been fairly well established and it would therefore appear as though group plans when applied to industry should be established on the basis of the combined medical attendance and hospital service.

In the establishment of a combined medical and hospital service plan it must be determined whether the medical service shall be provided by physicians engaged under contract or by the method of permitting the participation of all the reputable physicians in the community after the adoption of a fee schedule. Medical service by contract is only considered desirable in those instances where an industry is isolated or for some other reason cannot be assured of the best type of service by other means. An all-inclusive plan when organized under a contract system for medical service should guard against those features of contract practice which have been declared unethical and the medical group should have the unquestioned right to formulate and maintain the highest standards of professional practice.

To effectuate a workable group plan embracing hospital service and free clinic of medical attendance, it will be necessary for the medical group concerned to formulate an equitable fee schedule which should be adjusted from time to time so as to maintain the total charges for medical attendance within the portion of the subscriptions paid for that purpose.

Estimates that have been made as to the cost of complete hospital service and medical attendance to groups vary from $20 to $40 for each individual for one year. We have sufficient evidence at hand to indicate that hospital service alone can be furnished to groups at a cost not exceeding $12 per year per individual and it is believed that adequate medical attendance can be combined with it by doubling this sum, or for $24 per annum.

Where the free choice of physician is contemplated the following safeguards should be considered:

(a) All of the professional aspects of the plan including the fee schedule and the method of payment should be subject to regulation and adjustment by the local medical society.

(b) The plan should not involve the solicitation of patients directly or indirectly by the physician.

(c) Compensation and all other conditions should be such as to assure good medical service.

(d) There should be no interference with reasonable competition and the free choice of physician should be enjoyed by the subscriber, within such limitations as will assure competent service.

(e) The agreement between the physicians and the hospital group should be in accord with sound public policy and the code of ethics of the American Medical Association.

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* "Medical Service in Industry, A Statistical Outline" by Hart Ellis Fisher, M.D., F. A. C. S., *Industrial Medicine*, Vol. 1, No. 1, Page 38, October, 1932.

Practical Application of the Plan

WE WILL NOW give some consideration to the details of the application of a specific prepayment plan for hospital service, without medical attendance, to a town with a population of 64,000 in which there are two hospitals, each with 150 beds.

ESTIMATED ENROLLMENT: It is essential before embarking upon the organization of a group-plan to estimate as nearly as possible the number of subscribers that may be anticipated so that the extent of the job and the time necessary for its completion may be calculated. In estimating enrollment a safe rule to follow is to divide the entire population to be served into families of four individuals, in accordance with the practice of the United States Census Bureau in breaking down population groups to secure social units. The sum resulting by dividing the population by four will give the number of wage earners or heads of families in the community who would be eligible for enrollment if employed. From this number there should be subtracted not less than 50% to cover the unemployed and those who, for one reason or another, might be ineligible or disinterested. The remainder, constituting one-eighth of the population, will give a reasonable estimate of the prospective number of subscribers to be expected. Using these calculations, a population of 64,000 would offer the possibility of an 8,000 enrollment from wage earners exclusively.

MORBIDITY EXPECTANCY AND HOSPITAL DAYS: It is deduced from an exhaustive study of morbidity statistics from many sources and under widely differing conditions, that for a plan of the scope of the one under consideration not less than 12% of the entire enrollment must be anticipated as beneficiaries, and that each one of this number will utilize the hospital for 12 days. In actual practice, of course, it is recognized that many will use the hospital for a few days, while others will probably remain for the full 21days allowed, but these averages are based on wide experience and are believed to be well within reasonable expectancy.

With an enrollment of 8,000 subscribers, the number of patients will be 960, and the number of hospital days 11,520.

HOSPITAL SERVICE EXPENSE: Since a plan of this type can never be considered entirely safe until an adequate reserve fund has been set up, it is necessary to accumulate the fund as quickly as possible by assuming at first a high morbidity incidence; a liberal allowance for bed usage; by paying the lowest possible rate to the hospitals; and maintaining administrative costs at a minimum. Thus, we propose to offer only four-bed ward accommodations at $4.50 a day, with the understanding, of course, that those who desire more privacy may have it at their own expense. At this rate the most complete service can and should be offered.

Calculating the expense for hospital service on the basis of 11,520 hospital days at $4.50, we have a total of $51,840, representing the annual outlay.

ADMINISTRATIVE EXPENSE: Rather careful calculations have been made as to administrative expense for various size enrollments and the percentage of total income varies from 15% for a 1,500 enrollment to 6% for 15,000, and above that number the percentage can be further reduced.

For an enrollment of 8,000, the administrative costs should not exceed 8% of the total annual income, which would be $7,680.

ORGANIZATION EXPENSE: The only practical means of estimating the fee to be paid to an organizing agency is to base compensation upon the amount of work to be done and the time consumed. These factors can be judged from the enrollment objective, and so we use the anticipated enrolling for this purpose. There should be no difficulty in securing the services of a competent organizing agency willing to accept compensation upon the basis of $2 per enrollment in the small groups and gradually reducing this sum to $.85 per enrollment for groups reaching 100,000. For the 8,000 group it is believed that the $1.80 fee is reasonable and so the organizing charge for the first year would be $14,400.

In no instance should the organizing agency be allowed any remuneration for renewals and there should be a proviso in the contract binding the agency to secure a part of the enrollment objective.

INCOME, EXPENSE AND RESERVE: The cheaper the cost of enrollment, of course, the easier it will be to secure subscribers, but this fact must not be permitted to unduly influence a fund during the first few years. It must be constantly remembered that with a guarantee of 21 days @ $4.50 a day to each subscriber, there is a potential annual liability for each beneficiary of $94.50, and an anticipated liability of 12 days @ $4.50 or $54.00. It, therefore, seems wise and expedient to place the enrollment fee at $12 a year in the beginning, and as reserves are established, this charge may be reduced, the service may be extended to dependents, or the rate to hospitals be increased.

For an enrollment of 8,000 @ $12 each, the total income will be $96,000.

We have already indicated that the rate of $4.50 per patient per day, or.....$51,840 for the year is to be paid to the hospital, and that for the group under consideration the administrative expense will be .....$7,680, and the organizing charge for the first year..$14,400, thus making a total expense of .....$73,920.

The difference between the income and expense will equal the anticipated surplus for the first year, a total sum of .....$22,080.
To this amount will be added the second year$14,400, representing the initial organization charge.

The surplus should be placed in the reserve to be accumulated until it reaches at least twice the anticipated annual liability, which, in this case, would be the hospital and administrative costs ($59,500) multiplied by two, or a total of .....$199,000.

Conclusion

I HAVE ENDEAVORED to briefly outline the fundamental factors involved in the inauguration of a plan for the group payment of hospital service on a cooperative basis.

The plan suggested is practical, feasible, and a logical solution to a very important element in the costs of medical care.

If all of the factors herein set forth are thoroughly understood and embodied in a plan under the guidance and counsel of someone who is familiar with both hospital practice and the principles of the group payment plan, there is no reason why this activity cannot be established in every communtiy where a sufficient enrollment is possible and there are no legal obstacles, thereby meeting a pressing need of the wage earner and supporting the local hospitals.

While it has been emphasized that the scope of these plans does not ordinarily embrace professional attendance, the feasibility of combining hospital service and medical attendance by agreements with physicians has been referred to and a few of the major problems relating thereto have been mentioned.

The factors to be considered when professional attendance is added are: the control of the standards of medical service by the professional group concerned; the fixing of a reasonable fee schedule; increase of the monthly payment to a sum sufficient to adequately remunerate the physicians; and finally, an understanding that there should be the widest possible choice of physician by the subscribers.

As has been pointed out the promotion of these plans is limited at present to those states which have placed them outside the purview of the state insurance regulations, but regulatory legislation for the protection of the movement is advised in all states.

Traumatic Neurosis

IN THE COURSE of his employment, an employee fell, striking the lower part of his abdomen on a hand truck. He was laid up for four or five weeks, during which time he received compensation. Then he worked for about 10 months, but he quit because his condition was growing worse. A herniotomy was performed, but apparently he received no relief. Although an application for further compensation was rejected, he did not appeal from the decision. About 18 months later, however, he filed a new claim, alleging that since the prior hearing he had developed "a post traumatic neurosis" as a result of the original injury and was totally and permanently disabled. He was awarded compensation and his employer appealed to the Supreme Court of Nebraska. His employer first contended that the claimant was barred from recovering compensation by the former proceedings. But, said the Supreme Court, two, physicians testified that the claimant's condition might be latent and is of a progressive nature, and that it was not discovered until shortly before the present action was instituted; and under the Nebraska workmen's compensation act, when an injury is latent, is of a progressive nature and culminates in compensable disability, a claim may be filled within a year after its culmination. The condition for which compensation is now asked, "a post traumatic neurosis," was not involved in the former proceedings. The employer's contention that the claimant's present condition was not caused by the industrial accident, according to the Supreme Court, was disproved by the evidence. One physician testified that he had seen the claimant about 50 or 60 times since the injury and that his present condition was the direct result of that injury. Another physician testified that there was a definite proximate relation between the injury and the employer's present condition and that there were no intervening factors to account for that condition. No physician testified to the contrary. Accordingly, compensation was awarded the employee.—*Marler v. Grainger Bros.* (Neb.), 243 N. W. 622.

Experiments in Lighting and Miners' Nystagmus

INTERESTING experiments have been carried out in a coal mine in England where different groups used high candle power electric lamps for a six-months period, while a control group was equipped with the ordinary miners' lamps.

In the former group no signs of nystagmus developed among the 22 miners who started out with normal vision; among five who were suffering from nystagmus at the beginning of the experiment, two were cured and one considerably improved. After two years, all the nystagmus cases were without symptoms or characteristic reflexes.

In the control group, equipped with ordinary miners' lamps as noted, one new case of nystagmus developed. —Note and Comment in *The Sight-Saving Review.*

Workmen's Compensation

—A Complete Study of the Subject with Special Reference to its Medicolegal Aspects—

by

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SINCE the advent of workmen's compensation as a means of protecting the financial interest of injured workmen and the dependents of those killed while performing the duties of industrial workers, practically all of the states of the United States have adopted some form of systematic procedure for this purpose.

The principles which are fundamental are the guiding force throughout but it is interesting to study the details and changes which have been made from time to time over a period of years. The question of raising the fund for compensation is the first requirement. Whether this is accomplished by voluntary affiliation or is made compulsory depends upon the jurisdiction within which the principle is invoked.

The other most important phase is the disbursement of this fund and it is within this principle that the practical working of the system means so much. The collection may soon be inadequate if there is error in disbursement and yet an excessive collection would defeat in another way the real purpose of the act.

"Let her have needful but not lavish means," Shakespeare. Thus so much depends upon the disability as reported by medical evidence and in most instances the point of greatest importance has received the least attention and consideration.

I. The Minor Injury

FOR PURPOSES of classification the minor accident will be treated under the following definition, viz: any accident to an employee occurring in the course of, and arising out of, his employment which results in personal injury to the employee and does not necessitate a loss of time over the waiting period for compensation.

Various jurisdictions provide different waiting periods—some three, five or seven days, and in other instances the compensation reverts to the day of injury when the loss of time amounts to over one or two weeks. Thus a classification of minor accidents would depend upon the jurisdiction, but under the classification here it will be applicable in any jurisdiction since it rests entirely upon whether or not the claimant is entitled to compensation for loss of time. If he is not, then for the purposes of this work, he is a minor case.

There are a number of provisions in different jurisdictions for the payment of medical fees. In Ohio, the injured workman is entitled to medical fees so long as his injury is compensable, that is, incurred in line of duty. This fee is paid by the Industrial Commission (in Ohio) direct to the attending physician and is submitted on a form which will be discussed under the chapter on "The Physician."

The amount, however, is limited unless proof shows the necessity of additional sums.

Laying aside all preliminary topics of safety and the direct cause of an accident, we will take up for consideration a given case and follow it through the different situations, such as where the small employer has no coverage and is not legally required to have it, where the employer is required to have coverage but has failed to comply, where coverage is handled by the employer at his discretion, where the employer is

covered by the state, and where the supposedly minor injury develops a major phase.

No Coverage and None Required

THESE CASES arise among the smaller employers —in Ohio those with less than three employees. The employers not being required to cover their employees, in most instances make no attempt to do so, but some seek protection through private insurance companies.

Take for example, a clerk in a retail store. Naturally hazards vary in different employments but for the most part clerks have about the same duties unless they are subjected to machinery, such as choppers, slicers or grinders — for example those used in grocery stores and butcher shops.

The employee cuts his finger or runs a splinter into it, punctures his hand with a sharp pencil or meat hook, or drops something on his foot, or raises up from a stooping position under an open refrigerator door, striking his head, or closes a door upon his finger, or slips on the floor. There are all manner of ways in which he might sustain a minor injury. And each injury is different and affects the injured in different ways because of his reaction to it.

This reaction sometimes assumes great proportions. I have in mind a case where a young lady in a department store caught her finger in a door. It was pinched, but not severely. As she took an appraisal of her misfortune she toppled over in a faint. Another clerk standing close by became affected and in turn fainted. As she fell, her head struck the head of another clerk, raising quite a goose egg and she in turn fainted. So we had three down and two to go, for they promptly took on a little hysteria. I cite this to show how far reaching the effects of a small accident may be. Many times some such circumstance involves the employer needlessly.

Should one of these girls have fallen on a cement floor or against a hard object and sustained a fracture of the skull resulting in death, would such a case be considered as one of the haxards of industry. It is indeed very unfair to charge industry with such a situation, although commissions have allowed claims which were even of greater uncertanity.

For purposes of explanation, assume that the finger was crushed and unattended by any fainting parties. The nail has been loosened and bleeding ensues. A scampering and holding of the finger to prevent the blood from dripping on the floor and a rush for a water faucet follows. One fellow employee suggests putting it under hot water, another under cold, etc. In the same situation on an outside job the suggestion would probably be to apply a quid of tobacco or cow dung or spider webs, salt, grease, turpentine, iodine, soap and sugar or heaven knows what not.

In any event we will assume that bleeding stops and the wound is bound with a dirty cloth, on the theory that nature should take its course. I use the word dirty in the sense that it is not surgically clean.

Right here let me say a word regarding the use of iodine. This therapeutic agent received its greatest stimulus as an emergency application during the Spanish-American war when it was extensively used by army surgeons. In my experience it has caused greater harm and suffering because of its indiscriminate use than any single agent used for the decoration of an injury.

Iodine is sold usually from the druggists shelf and in this solution is dangerous. Well diluted solutions, say 2% or 3% are not damaging to tissue but when the solution, as it is ordinarily purchased, stands around in some emergency or first aid cabinet or in the home, evaporation causes it to become more concentrated and proportionately of greater danger. I have had occasion to treat many, many iodine burns which are often complicated by infection. The reason for this is that iodine is a decided irritant. It does no good on the fresh wound and damages the surrounding tissue to such an extent that it becomes devitalized and permits of ready access to infection

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A study of the literature on workmen's compensation reveals a wealth of information as to its history, the principle upon which it is based, the prevention of industrial accidents, the psychological causes of accidents, actuarial statistics in abundance, administration and allied phases.

But very little stress has been placed upon the medical phase of the subject.

This is most important, because practically every industrial accident requires the care of a qualified and well trained medical mind, especially analytical of industrial problems.

It is the purpose of the author to show just how important the medical phase of workmen's compensation is, and to bring it to the attention of industrial commissions, the employer, the physician, the attorney, the employee and society.

Because so many subjects have definite interrelation, a certain amount of repetition is made necessary, but in each instance the purpose is to emphasize the importance of some one point.

The success of this work will depend on the thought that is stimulated by it. Its benefits will only accrue by analyzing and applying the practical points which are set forth.

For detail as to the specific subjects where there is mention in general terms, the authorities are not difficult to find and consult.

I have purposely omitted tables, graphs and statistics of great number, the reason being explained throughout the work.

THE AUTHOR

which the tissue itself ordinarily has the power to combat. I do not recommend it as an emergency dressing in the hands of the layman at any time or under any circumstances.

Mercurochrome is the emergency antiseptic of choice because it stays put and does no harm. As to its actual value, in my opinion, it is meritorious.

Coming back to our crushed finger, let us assume that it has been attended in one of the ways set forth. The patient continues to care for the injury probably because of the confidence in his ability to look after it, or he does not care to incur the expense of a doctor bill which he would be responsible for if his employer had no coverage. The wound may proceed to recovery without difficulty and it may not. Nature is funny that way. If no complications arise, well and good, and the case is closed. If a complication, such as infection or fear, creeps into the picture, it may result in anything from recovery to loss or stiffening of the finger, loss of the hand or arm, or possibly it may result fatally. When the complications become of sufficient magnitude the services of a doctor are sought. Here then begins the discomfort and the building up of a medical bill which could have been averted had the injury had timely and proper attention.

In view of the occurrence of these conditions so many, many times, too much stress cannot be laid upon the importance of any injury, regardless of its apparent severity, receiving prompt and proper attention. When the other route is taken, it may be very costly and unnecessarily so. The Ohio law makes it imperative to have medical attention in any injury regardless of severity, but these words so often are mere fiction or the provision is not followed as it should be, and we find that many employers trust this work to nurses and attendants supposedly schooled in first aid.

This assertion is immediately confronted with the argument that it is impossible to have a doctor see every little thing that happens. Nothing could be farther from the truth, as will be pointed out in the chapter on "Physicians."

The case under discussion was one where no coverage was had and none required; therefore, the medical expense, if any, must be borne by the employee. There would, of course, be remaining the common law rights of both parties.

Employer Required but not Covered

WHEN the employer required to be covered by the statute has failed or neglected to conform, the employee may resort to whatever provisions are left open to him, but in most instances this is a rather involved procedure and the employee must seek legal advice which probably would not justify or compensate in the end for the annoyance.

When Employer is Covered

TAKING a case where the employer has complied with the statute, the procedure is not complicated in most jurisdictions. In Ohio it is simple. When the accident occurs, if it happens in line of duty, the employee simply reports it and should be promptly taken to a physician.

Shopping for a Doctor

THE GREAT inconvenience in such cases is the lack of proper system when the situation presents itself. Much time is lost by going from one office to another in the attempt to receive attention. Not finding one physician in the office, another is sought and so on until an office is found where the doctor is in. In general practice, the doctor though in, may not be in a position to give immediate service and another wait is necessary. It is, therefore, important that this work, whenever possible, be done by doctors who are practicing industrial surgery, for the service is immediate. The early care of any injury is one of the most important phases of treatment for so much more can be accomplished while the injury is still "numb from shock." The wounds may be repaired in the majority of instances without even a local anesthetic, thereby saving suffering to the injured and greatly lessening the medical expense.

Importance of Proper Record

ONCE the injury is properly cared for and dressed, a full record of the case may be taken, the forms properly filled out and the case sent upon its way fully instructed as to how the patient should conduct himself.

At this time a full record should be made for the doctor's office and all subsequent data made a part of this record until the case is completed. Then it should be filed so that it may be referred to at any future time.

Proper Set-up for Attention to Injured

IN INSTANCES where the employer is carrying his own liability, that is, looking after the details of compensation, medical care, etc., through his own organization, we often find difficulties similar to those just explained. An employer carrying his own risk should provide every means for proper care. This department should be headed by a full-time physician or a physician giving his full time to industry. The medical department should not be under the control of the police or safety department.

A much more efficient system can be attained if the

medical department is kept distinctly by itself and held alone responsible for its work. No one except a thoroughly qualified, industrial-minded physician should be employed in this capacity. It is not such work as is permissibly delegated to a nurse or claim agent. Employers in most instances view their medical departments with too little importance.

In all cases beginning as minor cases or injuries which are considered of minor importance, there is always the possibility, either through neglect of the physician or ignorance or lack of interest on the part of the employer, of the case falling into the major class because complications have developed.

Attitude of the Employee

A MOST important phase is the attitude of the injured employee. Being a human being and subject to all the emotions and deductions that one under such circumstances would make, there develops a self-concerned interest, from the standpoint of both recovery and compensation.

Depending, of course upon the length of time of the waiting period for compensation, the employee appraises the situation in one or more of several ways. Usually the stand is taken that it was no fault of his that he was injured. He is prone to hold the employer, the machinery, the working conditions or something else responsible. Occasionally we find an employee stating that he should have known better, that it was his own carelessness, etc., but generally, in his opinion, someone or something other than himself is at fault. Comparatively few employees see the employer's side of the case.

Invariably the question is asked, "When do I get my compensation?" It is often not understood that there is a waiting period. An explanation will usually satisfy, but there are those who insist that they should have their wages or be compensated in some way, although they have no idea how it is to be done.

So often employees would rather be off to pass the waiting period so they may get compensation, if only for a day or two. There seems to be some sort of mental satisfaction in receiving compensation. By proper explanation usually it will be reasoned that by going back to work a wage is again being earned, thereby placing the workman in better financial condition, even though he is required to work under a slight handicap and with some pain. The psychology of injury is extremely interesting and will be dealt with at greater length in the next chapter.

During the waiting period, the attitude of the employer is a very important factor. If the employee can be permitted to return within a day or two after his injury his mental attitude will not change for he is not confronted with the suggestion that he is losing anything. Employers have a wonderful opportunity to come more than half way in such situations. Naturally, a worthless employee is sometimes more than worthless, he is actually in the way. But when work can be arranged, it is the ideal thing to have the workman kept on. He not only feels that he is worth something but his routine also prevents the psychology of injury from taking hold of him.

The employer having already replaced the injured workman, it is not always a simple thing to put the injured man back on the job. I am referring to cases where there is a disability only sufficient to interfere with the normal production. It is more difficult to make room, so to speak, for an injured employee on a construction job than it is in the manufacturing plant; but when the arrangement can be made, it will usually work to advantage for employer and employee alike. He should not, however, be put to work at something that will probably cause another injury. We have had it happen, where an overly anxious employee returned to the plant, that another injury was sustained. The question is always an individual one and requires the close cooperation of the foreman and the medical department.

When the injured workman clothes himself with the self-pity or suffering-hero phychology, much mental treatment is indicated before he will resume his employment—and once he runs over the waiting period and finds himself in the compensation class, the effects of his injury begin to magnify and drag him lower. These cases are the most difficult to handle from a medical point of view and place a very wrong construction upon the efforts of the physician. Running on as they do, the physician insists upon a return to employment and the workman promptly dismisses himself and seeks other medical counsel. This situation brings us into a major case that was actually and to all intents and purposes a minor. But it has become a major and must be handled as such.

Attitude of the Employer

HERE is where the employer should have full understanding of and full confidence in his medical department. If he does not have, there is not the proper cooperation and much harm is done and more expense incurred.

When the injured employee is sufficiently recovered from his injury, assuming that the case is one which we have classed as a minor or one that will not lose time beyond the normal waiting period, the medical department should inform the employer that the injured workman is able to resume work. This means that he is capable of performing those duties which do not bring stress upon his injury. At times he may

be used to fill in or do a part of his regular work. This adjustment is to be made by his immediate superior.

Owing to the fact that the injury is not completely healed and the case still remains under the care of the physician, it is easy to understand that the greatest cooperation between the medical department is of vital necessity. This is of great benefit to both employer and employee because it reflects an interest from both sides and tends to build up plant morale.

II. The Major Injury

CLASSIFICATION: Conforming to the classification previously made, we now consider the major case. This includes all cases other than minor, or rather, cases which do not return to work within the waiting period. The same description of follow-through will be applied, showing why statistics do not reflect the real story, the importance of immediate attention, hospital care, home care and nursing services, discharge from the hospital or home confinement, the subsequent office care, the return to light work, discharge from treatment when fully recovered, compensation for loss of time, compensation for partial permanent disability, compensation for total permanent disability, rehabilitation, the final award, investigation, the attendant psychosis, data upon which the Commission acts, special examinations and attorney cases. Each topic will be discussed separately and by reference so that a picture of what happens may be presented.

When this type of accident occurs, it may be anything from a crushed toe to a fracture of the skull or other severe type of fracture. All degrees of severity are included except the so-called minor and those resulting fatally. The minor cases have already been covered and the fatal cases will be taken up in the next chapter.

Statistics Misleading

IT IS QUITE apropos to say a word here regarding statistics. The reports compiling so many accidents losing time less than the waiting period and so many over the waiting period, are very often misleading. The reason is this: many of the larger organizations, in an attempt to gain a merit rating or display their safety efficiency, do not report minor accidents. The medical department, in some instances, as I have learned from their surgeons, seem to use their own judgment as to what constitutes a reportable injury, for example, the mere emergency dressing, or the simple removal of a foreign body from the eye, perhaps a small splinter from the skin or again a slight contusion, these are not reported. This is true, not only of organizations having their own medical department but it is also true of employers who permit a time-keeper or first aid attendant to dress injuries. Therefore, the minor cases *reported*, are the only ones reflected in statistics.

Where the employer experiences an injury in his plant, though the injury might under the circumstances run over the waiting period, the injured workman is kept on the payroll and thus it is not considered an accident and, therefore, is not reported. Those who are familiar with compensation work have many times observed that this or that company went so and so long without a single accident. What they mean to say is that they have gone so long without an accident *which they considered worthy of reporting*. This, of course leaves the door wide open and does not reflect the real figures. Nor will they be reflected until *every* employer reports *every* accident.

It is a fact that a serious accident may occur at any time to any employee under any employer. I have in mind a case where an ordinary office clerk, who would be considered as not being subjected to any particular hazard at any time, came in contact with an extension cord or light socket and died as the result of the electric shock. This is, of course, a very unusual case, but it is this type of case that causes the employer great annoyance and often litigation. So it behooves every employer to have some definite arrangement for care when the emergency arises.

Necessity for Systematic Procedure

TAKE A CASE where the employee is injured, suffers severe shock and collapse. Invariably great excitement ensues and no one knows just what to do. I have been called on cases where as many as three different doctors have been called, in addition to a couple of ambulances. This situation only arises because of lack of systematic handling. When this service is definitely arranged for, there should be no confusion. Prompt and efficient attention and care will be had. Often the case is not as serious as imagined but when the doctor is called, he should be in a position to respond at once. This is not possible in the case if the doctor is engaged in general practice.

In districts where this industrial service is not available, it is only necessary to call an ambulance or use the car of an employee and transport the injured to the nearest place where attention may be had.

Hospital Care

ASSUMING that proper arrangements have been made, a physician is not immediately available and the injured is taken to the nearest hospital. It might be well to mention here that bleeding wounds should not be tampered with. If the bleeding is

venous, that is, dark and not spurting, a tight, clean compress over the wound will suffice until the case is brought under the proper care. If the bleeding is spurting, that is, intermittently shooting from the wound, simultaneous with the pulse beat, a tourniquet made from some elastic, even a garter or suspender, applied on the member above the bleeding point, will answer until brought under proper care. *Often venous bleeding is aggravated by a misapplied constriction.*

Bleeding always causes great anxiety on the part of the injured and the observers. Good judgment and coolheadedness are essential. I recall a reported case where a female employee, because of the bleeding of her injury, so shocked an associate female worker that she suffered a "nervous breakdown" and applied for compensation, and—it was allowed.

We had better get our case into the hospital or under proper medical care or he may bleed to death right here in this chapter, so let us proceed. It is important that the case get into the hands of a medical man qualified in accident work. The judgment which is built up by training and experience is very important. I have seen a number of fingers and hands saved by conservative procedure, where the judgment of the general surgeon would have resulted in amputation. It is easy enough to amputate; that can be done anytime. But a member once removed cannot be replaced. I do not infer that amputaiton is necessary, but I do insist that the injured member should have every opportunity to "stay put."

Hospitalization of industrial cases in Ohio is arranged for by contract with the hospital as to charges. Some hospitals have better facilities than others, but I am of the opinion that these cases should be given every consideration by hospital authorities and are entitled to the best of care and attention. Some hospital staffs seem to feel otherwise and go so far as to attempt the limitation of the industrial surgeon. Where this situation maintains, it should promptly be corrected.

Sometimes a great deal of complaint is lodged against the character of treatment received in the hospital. My experience has been that occasionally the complaint is justified, but in most instances the patient himself is the cause of the difficulty and because of his makeup and conduct he finds fault simply for the purpose of complaining. Fortunately, these instances are few, and whenever they arise they should be examined for the purpose of finding out where the fault really lies.

Home Care and Nursing Service

HOME CARE or hospital care is often a question in the practice of this branch of medicine. It may be that an injury demanding confinement in bed may well be cared for at home. The same injury in a rooming house or hotel resident would demand hospitalization because of the necessary general care. Some cases refuse to go to a hospital, others seek it too readily, especially if they have acquired a fondness for the surroundings. As has been pointed out, the nursing service is an important part of hospital care. In the home the cost of nursing service should be allowed if it is necessary. Members of the family may at times be compensated for this service.

Discharge from Hospital or Confinement in Home

WHEN the case has sufficiently recovered to be ambulatory, treatment should be continued at the office. The change of mental attitude of the injured is worthwhile for he begins to restore confidence in his ability to get about again. This procedure should be followed as early as possible. More on this point will be discussed under the chapter on "Physicians."

Office Care and Return to Light Work

IT IS ADVISABLE to return the injured employee to light work as soon as possible, consistent, of course, with his injury. By this is meant some form of employment or some part of his work that will serve as a means of keeping him interested and make it possible for him to earn something, though it may be less than his regular wage. This phase is sometimes difficult to handle because of the attitude taken by the employer or the employee, or probably both. Experience has taught us that too much reliance cannot be placed on what the employee said, so we make it a practice to discuss the case with the employer. It so happens at times, that the employer is not in a position to return the injured to light work and, in every instance, this period in the recovery becomes a long drawn out affair.

At the present writing, we have a case under observation whose lost time runs into months. Physically the employee is able to resume employment, but he has been under the observation of so many physicians and subjected to examinations by the commission that the mental twist has taken the upper hand. This case will be discussed at greater length under "Attorneys Cases."

Discharge from Treatment, Fully Recovered

THERE is little to say on this point for as soon as recovery is complete, the case should be returned to work and his compensation stopped. The greatest difficulty here is again presented when the employer has no place for the recovered workman or definitely discharges him. It is of paramount importance that the employer have a full understanding of

this situation for there is no one better able to correct this hitch. This is fundamentally an employer problem.

Compensation for Partial Permanent Disability

THERE MAY be compensation due for loss of a member or for loss of use. This is easily computed but should depend upon the recommendation of the attending physician supplemented with the findings of the commission examiner. Statutory schedules are applicable in these cases.

Compensation for Total Permanent Disability

BY THIS is meant, or should be meant, the complete disabling from further pursuing a gainful occupation. These cases are made too frequent and are not properly diagnosed many times. Here again the attorney becomes a factor, and often the commission findings are arrived at without a proper understanding of the case. At other times perfectly legitimate claims are disallowed because of some technicality of the law or insufficient and incomplete presentation of the claim.

Rehabilitation

SINCE the world war, we have heard a great deal about rehabilitation. A field is opened up for the accomplishment of great good in certain cases, but the primary efforts are those of mental rehabilitation first. If the injured can be made to understand his condition and will attempt a self analysis, the possibility of physicial rehabilitation is much greater. This problem is decidedly one depending upon the individual. Some are readily rehabilitated. As a matter of fact, this is true in most instances because after any injury involving loss of time, there is a period of reconstruction on the part of the employee. This rehabilitation comes about by the efforts of the workman himself, but the observation and interest on the part of the attending physician play no small part.

Final Award—Should be Kept Under Observation

THIS BRINGS us to a procedure we have found works out very satisfactorily. At the time of discharge from active treatment, there is usually displayed an amount of uncertainty in the mind of the injured. As has been pointed out, he questions whether he has sufficiently recovered. He is seized with a certain amount of fear as to losing his job and what will become of him if he does. He recalls that so and so was hurt and a short time after he went back to work he was discharged. He wants to know what will happen to his compensation if he goes back to work. It takes but a little extra time to explain this and it is the physician's duty to become familiar with this phase and also take time to explain it.

We usually instruct him that upon his return to work, coincident with restoration to the payroll of his wage, his compensation will cease as it rightfully should; but to relieve him of an uncertainty we add that he is being discharged for observation. Although his case is closed from active treatment we instruct him to return at a later date simply to check up on him. This with us, is common practice, for which we make no charge. It is the safeguarding of the injury and a valuable mental lift to the injured. If he returns for a check up, the interval is prolonged until he has fully developed the confidence in his recovery.

To my mind, this is a very important period in the handling of a case and much good can flow from it. It makes for a better understanding between the employer and employee although neither of them is conscious of the fact.

Investigation

THE INVESTIGATION of accidents comprises several phases. It may be classified as (1) of minor accidents, (2) of major accidents, and (3) of all alleged accidents of questionable cause.

Minor accidents seldom need investigation from the angle of the employee as far as his injury is concerned, except for the manner and surrounding circumstances under which it occurred. This type of investigation is more important for a safety angle in lessening the possibility of future occurence of the same accident or correcting dangerous conditions.

Major accidents are the ones which demand the time of the paid investigator, as he conducts his work under the commission or claims department. Whether a minor accident so classified runs into a major or is major from its onset, does not change the necessity for it. The necessity usually arises by reason of a claim for compensation, and investigation is made to arrive at a conclusion as to whether or not the claim is proper.

The cases present themselves in a number of ways. Either the original claim has been disallowed or there seems to be insufficient evidence to support it. If the case is properly reported and handled from the beginning, there is little indication for investigation but wherever there has been a break in the chronology of it, invariably investigation is essential.

Take the case of an accident cared for in a haphazard manner and not reported. Later, infection develops, or there may be other complications, and a loss of time is experienced. The claimant applies for compensation. No record is found and the question arises as to the actual occurrence of any injury.

No other channel is left open except that of an investigation. The mere slipping of a cog here is wasting endless time and expense which could have been avoided had the accident been properly cared for and reported. The time elapsing between the alleged date of injury and date of filing the claim permits all manner of possibility of extraneous happenings with which the original injury, if any, has nothing to do. False claims are built up, sometimes innocently and at other times deliberately, but it means a job for the investigator. The statements of witnesses are not always dependable, since the human mind is subject to a failure of recollection and also a misinterpretation of facts.

These cases present the strongest argument in favor of the prompt attention and recording of the accident at the time it happens.

The lost-time case which makes the rounds from one doctor to another adds more to the work of the investigator. By the time the case has passed through a number of hands the findings of the different doctors are at variance, and what seems to have begun as a bump on the toe ends up in a case of sugar diabetes. The files of the commissions are packed with cases of this nature, and the amounts that have been awarded on such claims are staggering.

I have in mind a case where the mere slip on the floor, causing a sprained wrist, ran into thousands of dollars, operations galore, even including abdominal operations, x-rays, specialist examinations and a file of data absorbing reams of paper, and the commission allowed all the costs. Another case not reported until two months after the alleged injury, claimed hemorrhoids or piles from lifting a stone. Later the record was augmented with a series of crushed toes. The claimant was past middle life.

The case was subjected to all sorts of examinations and x-rays which had no more application in the case than a bucket of water on a flower bed after a cloudburst. But this case became a long drawn out major case.

As a rule, there is a very definite line of demarkation in accident cases and there should be little difficulty in presenting these cases and arriving at a proper conclusion concerning them.

The attendant neurosis and mental and nervous system complications, such as psychosis, psychoneurosis, hypochondriasis, neurasthenia and malingering, will be treated later.

The facts coming to the commission should be very definite, for the question of compensation is one based upon sound principles of business and not upon the sympathetic or altruistic makeup of the commissioner's personality or upon influence brought through a labor or political channel.

Cancer and Occupation

ACCORDING to Report of the Royal Commission on the Use of Radium and X-rays in the Treatment of the Sick, as published in the Province of Ontario, Canada, there seems to be a definite relationship between the incidence of cancer and certain occupations:

(1) work in tar, pitch, and bitumen briquettes; (2) work in mineral oil or paraffin or in any compound, product or residue or either of these products; (3) work in arsenic; (4) work in x-rays and radium; (5) work in mines, namely, the lung affection of Saxon miners called "Bergkrankheit;" (6) chimney sweeps' work; and (7) work in anilin dyeworks.

Specific agents causing cancer require a long time to show effects, in some instances, the action of the irritant having disappeared long before the cancer declares itself.

The fact that Hoffman found no evidence of malignant tumors as a contributory cause of death in an analysis of nearly 2,000 death certificates of lead workers in the United States is significant in the lead treatment of cancer.

In the last few years statistics show that cancer has steadily increased among the industrial classes both in Canada and in the United States. The increase for the year 1931 as compared to 1930 was 8% for cancer of the digestive tract and peritoneum, and 6.3% for cancer of the breast.—Abstr., *American Journal of Public Health.*

Conference on Silicosis

THROUGH the cooperation of the Engineering Division of the St. Louis Safety Council and the St. Louis Medical Society, a conference on "Silicosis and Dust Hazards in Industry," was held in the St. Louis Medical Society Auditorium on Friday, January 20, 1933. The program was divided into two parts, the afternoon session occurring at 2 p. m. and the evening session at 7:30 p. m. The program follows:

"Where Harmful Industrial Dusts are Found," by S. R. Millman, Supervising Safety Engineer, Southwestern Department, Aetna Life Insurance Company.

"The Medical Side," by Dr. Albert E. Russell, U. S. Public Health Service, Washington, D. C.

"Remedial Measures—Controlling Dusts by Mechanical Means," by Alexander S. Langsdorf, Dean, School of Engineering, Washington University, St. Louis, Mo.

"Remedial Measures—Personal Protection of the Workers," by Dr. Frederick Willson, President, Willson Products Inc., Reading, Pensylvania.

"Legal Aspects," by Wm. O. Reeder, Attorney, Jones, Hocker, Sullivan & Gladney.

Cardiovascular Disease and Industry

—Chapter II. Rheumatic Heart Disease; and
Chapter III. SyphiliticHeart Disease—
by

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RHEUMATIC HEART DISEASE: This usually has its onset in childhood or adolescence and so in its early stages is seen but rarely by the industrial physician. It is a disease that is rarely found in prosperous communities; that is more commonly found in the children of those in the lower income groups. In adults, it appears as a rule, as chronic valvular and muscular heart disease with its incidence highest in the lower wage groups. These cardiacs are most apt to be in the lower wage groups because their parents have been unable to give them educational advantages or because the heart disease has considerably limited their physical activities.

Accurate diagnosis is of the utmost importance in rheumatic heart disease. Many individuals in their late teens or early twenties have functional systolic murmurs which by auscultation alone cannot be differentiated from those due to organic valvular disease. Furthermore many individuals with rheumatic heart disease have very slight impairment of cardiac function. The industrial physician who declines to pass such individuals for employment is apt to be the cause of an unnecessary increase in the number of those dependent on charity or of those with cardiac neuroses. Many of those with appreciable impairment of cardiac function may with safety be placed in positions that are such that the cardiac may perform his duties without discomfort. The situation of the industrial physician is in this respect very different from that of the life insurance examiner. The life expectancy of the individual with rheumatic valvular heart disease aged 21 is some 20 years less than that of the normal individual of that age and so it may be necessary for the insurance company to decline to insure him or to give him a policy with a high premium, one based on the life expectancy of such cardiacs and not one based on the life expectancy of normal individuals.

However, if such a cardiac aged 21 is so placed in industry that he can perform his duties without discomfort, he should be able to perform them effectively for about 20 years. During that period he should have little if any more absence due to illness than should the normal individual. There are no conditions in industry that cause rheumatic heart disease or an aggravation of preexisting rheumatic heart disease, except indirectly. The individual with chronic rheumatic valvular disease who sustains a fracture or concussion of the brain and as a complication contracts pneumonia may have a longer convalescence than a normal individual, and such a situation may cause an acute endocarditis to develop in the cardiac where it would not cause it in one with normal heart valves.

The development of heart failure in rheumatic heart disease almost invariably follows an infection, usually a respiratory tract infection and so these individuals should be educated to take better care of themselves when they have "colds" and to do all that they can to avoid them. The resulting infrequency of such infections should more than make up for the additional time lost when one is incurred. The reduction in the life expectancy of those in this group should not appreciably lessen their value in industry.

The individual with rheumatic heart disease is not more susceptible to accidents or more apt to cause accidents. Abrupt onset of heart failure is met with less frequently in this group of cardiacs than in those in which arterial disease is the etiological factor. In either case infection, not hard manual labor or trauma, is the usual cause of the onset of heart failure. Trauma and certain industrial poisons may cause the onset of symptoms of heart failure but are no more apt to do this in those with rheumatic heart disease than in those with normal hearts.

One of the regular duties of the industrial physician should be the prevention of illness among the employees under his supervision and this should include the prevention of disability due to disease as well as that due to injury. The individual who knows that he has a chronic rheumatic heart disease and knows how to avoid aggravating it, will pay much closer attention to preventive measures than will the normal individual. As a result he will have fewer absences because of illness than the normal individual. He will avoid fatigue, exposure, and excesses of all sorts; will lead a life most conducive to longevity. Just as the individual that has had an active tuberculosis, may, if he takes good care of himself, have a normal life expectancy and lead a most useful

life, so may he who has rheumatic heart disease.

The prevention of heart failure consists then chiefly in the prevention of illness among employees, especially in the prevention of respiratory tract infections. The prevention of rheumatic heart disease is another problem. As already stated this is especially a disease of the lower income groups infrequently found in the more prosperous communities. Its prevention would, therefore, seem to be more of a social than a medical problem. The industrial physicians should with such assistance as may be at their disposal, educate employees and their families to eat properly, to live in quarters that are properly ventilated and not over crowded, to persuade them that these things are much more important for the welfare of themselves, their wives and children than are the purchase of automobiles and other luxuries. The industrial physician should be the strongest advocate of better housing to replace the slums which breed rheumatic heart disease, tuberculosis and other chronic and acute diseases that so frequently are the direct or indirect cause of dependency on charity or state and so a drain on the community.

To summarize: 1. Accurate diagnosis is necessary to differentiate rheumatic heart disease from functional heart conditions.

2. There is a place in industry for the individual with chronic rheumatic valvular heart disease.

3. The prevention of rheumatic heart disease is a social rather than a medical problem but one in whose solving the industrial physician should take a leading part.

4. The prevention of heart failure in those with rheumatic heart disease, is in part a social problem intimately connected with the prevention of such disease but more especially an aspect of a general problem, the prevention of morbidity due to illness among employees.

Bacterial endocarditis, simple acute endocarditis, and subacute endocarditis will not be discussed as those forms of heart disease are due to infections and never to trauma or type or conditions of work and because those having such illnesses are not able to work.

SYPHILITIC HEART DISEASE: In syphilis, the heart becomes involved by the extension of a syphilitic aortitis over the aortic valves and the openings of the coronary arteries. It is unusual for syphilis to cause changes in the coronary arteries except in their most proximal portions; to cause myocardial changes other than those resulting from impaired coronary circulation or infrequently from gummata; to involve any valves except the aortic. While the infection reaches the aorta in the earlier stages of the disease, its progress is usually very slow. The symptoms of heart failure as a rule do not develop until about 20 years after the primary infection. With careful study it should be possible to make a diagnosis of syphilitic aortitis long before symptoms of heart failure arise but it is difficult to do this without the aid of the x-ray.

Cardio-aortic syphilis is a slowly progressive disease in which specific therapy must be used with great care. It appears that it does not respond to specific therapy as well as do some of the other types of the disease. The incidence of aortic syphilis is higher in the negro race than in the white. Whereas one would expect to find positive Wassermann tests more regularly in active arterial syphilis than in other types of the disease, it is well known that this is often not the case.

This disease is as a rule not diagnosed until far advanced; until an insufficiency of the aortic valves has developed or until symptoms of heart failure arise. If the diagnosis is made before the onset of heart failure, careful specific therapy may arrest the disease. However, after the onset of heart failure, less can be accomplished in this way. In addition the usual methods of treating the heart failure are not as efficacious as when rheumatism or arteriosclerosis are etiological factors. The result is that after the development of heart failure, the prognosis is distinctly bad, the life expectancy little more than two years. The highest mortality from cardio-aortic syphilis is between the forty-fifth and fifty-fifth years.

The problem presented to the industrial physician by this type of heart disease differs from that presented by rheumatic heart disease. Neither of them seem to be on the increase. In fact, syphilitic cardiovascular disease is probably less common than it was 20 or 30 years ago. This decrease is the result especially of better treatment of the disease during its early stages. Further decrease will result from the more uniform use of prophylaxis against venereal disease and from further improvement in methods of treatment. The industrial physician should insist that employees found to have evidence of syphilis, must have adequate treatment if they are to hold their positions. The prevention and early adequate treatment of syphilis are the methods of prevention of this form of cardiovascular disease.

When it comes to the employment or the continuing in employment of men with syphilitic heart and aortic disease, the attitude of the industrial physician should be quite different from that which he should have toward the man with rheumatic heart disease. Sudden death and the abrupt onset of heart failure occur frequently, due to sudden formation of or rupture of aneurysms, to interference with coronary circu-

lation. After the onset of heart failure, it is unusual that recovery is sufficient to enable resumption of any but the lightest kind of work. Because sudden changes occur in those with cardio-aortic syphilis, they may cause accidents.

To summarize: 1. Cardiovascular syphilis is a slowly progressive disease that is difficult to diagnose in its early stages.

2. After heart failure symptoms develop, the prognosis is bad.

3. The onset of heart failure is often abrupt.

4. Venereal prophylaxis and the adequate treatment of syphilis in its early stages should eventually cause this type of heart disease almost to disappear.

The Effect of War Gases

THE REMOTE EFFECTS of war gases are important not only from the point of view of establishing toxic effects of these substances after a passage of considerable length of time, but also in regard to various industrial exposures which occur more frequently.

The studies of Gilchrist and Matz of the Chemical Warfare Service and Veterans' Administration respectively, have to do with the late effects of mustard gas on 89 living patients and in 53 fatal cases in which adequate histories on sick-and-wounded cards were available. Eighty-nine living patients were examined clinically and roentgenologically; 27 of them appeared to show definite anatomic or symptomatic effects of mustard gassing. The study of 53 deceased beneficiaries of the Veterans' Bureau showed that mustard gas was said to be the immediate cause of death in 11 cases; death was due to late results of mustard gassing in four cases. In the remaining 38 cases, mustard gassing was not considered the cause of death. Among 27 men gassed during the war, who still live, 21 had chronic bronchitis at the time of this study, 10 had emphysema, six had bronchial asthma, and two had pulmonary tuberculosis. In 21 of these cases the disabilities now considered as residual were first noted immediately after gassing, but in six cases the residual disabilities did not appear until from one to 29 months later. Among 38 men who had been gassed and who subsequently died of diseases not related to gassing, there were eight whose deaths were due to pulmonary tuberculosis, which could in no way be attributed to mustard gassing. One should not hold, therefore, a dogmatic opinion as to whether mustard gassing may or may not reactivate latent tuberculosis. Each case should be studied individually to determine whether such a relation exists. Mustard gas as used in the war caused untold misery. While the mildest cases showed no systemic reaction, in severe cases it burned the eyes and skin, and plugged the bronchi with exudate; it produced an intense pallor, shock, and general collapse. Among those who recovered from its early effects are some who now, years later, have asthma, emphysema, chronic bronchitis, chronic conjunctivitis, and corneal opacities.—Editorial in *The Journal of The American Medical Association,* May 13, 1933.

Medical Economics

THE INCREASED COST of medical care is not out of proportion to the increased benefits to be derived from modern medical practice. The ideals of conservative medical practice are opposed to the various schemes that have been advanced for the practice of medicine under an insurance plan, or under a system of state medicine. The monthly payment plan for medical care is desirable from the standpoint of financial convenience, but, so far, no practical plan has been evolved which will permit us to practice medicine on that basis and at the same time maintain the high standards and ideals of our profession.

Employees should not be called upon to pay for the medical and surgical costs of industrial injuries. Employers should not exploit their employees by taking a profit out of the check-off collected from the employees for medical and hospital care.

In some localities in West Virginia, list hospital practice may be condoned as a necessary evil. The prepayment insurance plans for hospital service should be limited to hospital, strictly avoiding any connection with medical and surgical costs. All of the hospitals in a given territory, acting as a unit, should either adopt or reject the prepayment scheme. The state miners' hospitals have outlived their usefulness for the particular purpose for which they were intended and should be abolished.

The state institutions caring for the sick should have the benefit of medical supervision by a nonpartisan state health council. The medical care and hospitalization of the indigent is properly considered an obligation of the entire community.

The medical practice act should make it possible to revoke the license of any physician who lends his name and protection to a quack. Any infringement upon the proper domain of the private practitioner by state or county health departments should be discouraged.

It is necessary for us to get together frequently and discuss our medical problems. In this fast moving age the dream of today may become the reality of tomorrow, but on the other hand the accepted truism of today may become the absurdity of tomorrow.—Dr. D. A. MacGregor, in *The West Virginia Medical Journal,* June, 1933.

Medical and Surgical Fees

—In Which the Conclusion is Sustained that Neither Industrial Commissions Nor Insurance Companies Have Any Authority to Fix Them—

by

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THE QUESTION as to whether we, as physicians and surgeons, are compelled to accept such fees as are fixed in amount by industrial commissions and liability insurance companies, has caused more or less discussion among industrial surgeons, radiologists and other medical groups, as well as some litigation in the courts.

Because the writer has shown considerable interest in the legal side of medicine, he has been asked by physicians from all parts of this country (11 different states) for information on this important economic subject. And after a rather extended study and investigation of the matter he has been able to answer that, so far as he can learn, industrial commissions or boards have no more right to fix medical, surgical or hospital fees than they have to fix the price we shall pay for pajamas or the betting odds in a horse race.

It is conceded that, under certain conditions, industrial commissions have the right to fix the amount that the employer *shall pay to the employee* for medical and hospital services. These conditions are that the employer fails to provide medical attention for the injured employee and the latter arranges for and employs a physician himself. *But even then, the physician does not surrender his right to collect, by any legal method, what he deems to be just and adequate payment for his services.*

We have contended that physicians are not bound by, and have nothing to do with, the workings of the workmen's compensation laws except to attend the injured, and that the workmen's compensation acts or laws have nothing directly to do with us except that, because of provisions in these laws, employers are required to furnish our services to injured employees.

The fact that some employers do not furnish medical services to their injured employees, but leave the employment of physicians to the employees themselves, does not, cannot, and of right should not, give any one the right or privilege to fix the amount we should be paid for what we voluntarily do in the rendering of medical or surgical services to the aforementioned injured employees, any more than it should authorize or empower the same body, group or individual to fix the rate of the railroad or taxicab fare to or from the place where the injured employee receives our services.

The provisions in the workmen's compensation laws that the industrial commissions shall have authority to fix medical and hospital fees, *refer only to the amount the employer shall pay the injured employee, and have absolutely nothing to do with the amount of our fees.* We physicians are entirely outside of the discussion, as far as the amounts of our fees are concerned. These laws are legislation for the protection of the employee who might be injured while at work, and not for the physician—either one way or the other. To say it in the language of a learned judge:

"The meaning and intent of the workmen's compensation laws in every state are mainly and primarily intended for the protection of injured employees, and the provisions regarding their receiving medical attention do not, cannot, and are not intended to, include the medical profession as such, in any sense."

These points are most clearly brought out in the Wisconsin case[1] to which the particular attention of the reader is directed.

In Illinois, it has been decided in several instances where cases were appealed from the trial courts, that: "the industrial commission has no power as between the physician and his patient, to determine the amount of the fee to be charged for any medical service."

IN THE absence of a contract between the physician and the patient regarding the amount of the fee, the physician may collect a fair and reasonable fee for his services, any finding, ruling, regulation or decision by the industrial commission to the contrary notwithstanding.

In a case reviewed by the Illinois Court of Appeals, the verdict of the lower court favoring a physician who sued for his fee, the defendant contended that the industrial commission had a right to fix the amounts of the medical and surgical fees in industrial compensation cases. In rendering its decision in favor of the physician plaintiff, the Court said: "The question to be decided is whether it was the intention of the legislature, in the enactment of the provisions on which the defendant relies, to take away from the employer and a third person (in this case the physician) their right to contract with each other. Considering the whole act in connection with these provisions, we think it is apparent that such was not the

1. *Noer v. G. W. Jones Lumber Co.*, (Wis.), 175 N.W.R. 784.

intention of the legislature. The theory upon which our compensation act is based is that the parties to whom it applies—the employer and his employees—must voluntarily elect to come under its provisions. It is when they have so elected that the act deprives the courts of their jurisdiction to enforce contractual terms between them. The manner in which they shall come under the act is the same by which physicians, if they elect, may voluntarily come under its provisions."

In another Illinois Appellate Court decision[2] the Court held that the industrial commission had no jurisdiction over the amount of Dr. Hoyt's fees, as the latter had not elected to come under the compensation law.

Still another decision may be cited from the same Court, in which an employer had engaged a Centralia physician to care for an injured employee but refused to pay the bill, claiming that the fixing of the amount of the fee should have been done by the industrial commission.

In this (Centralia) case, the decision reads: "We find nothing in the workmen's compensation act that makes it obligatory upon a physician who is retained by an employer to treat his injured employees, to submit his claim for such services to the industrial commission for its determination, nor is jurisdiction conferred upon said commission to do so. In our opinion the court properly sustained the demurrer to the plea and the judgment should be affirmed."

In a case carried up to the Indiana Court of Appeals,[3] almost exactly the same words were used and identically the same conclusions arrived at.

THERE IS a multiplicity of decisions from the Supreme Court of Oklahoma that the state industrial commission is without jurisdiction to determine the amount of physicians' fees.

A leading and important decision[4] from the Supreme Court of Oklahoma is one wherein the court reversed an award by the Industrial Commission for $600 to a physician who had attended an injured employee of a corporation, made after awards had been made to the employee which included $850 for medical services, and appealed by the insurance company. The facts were that the employee's injuries were such that it was necessary to operate on the brain to restore him to consciousness; the attending physician did not feel capable of performing the operation; the president agreeing, a specialist was employed. The insurance carrier under the workmen's compensation act, on being informed of the employment of the surgeon, objected to it, and stated that it would not pay for his services, whereupon the attending physician replied that he would pay for them himself. The insurance carrier tendered the services of another surgeon, which were refused. The award made—$600—was to reimburse the attending physician for money paid by him to the specialist from Chicago. The Court said:

"Under the provisions of the workmen's compensation act of Oklahoma, *if the employer furnishes medical services, he becomes liable to the physicians on contract.* If he neglects or refuses to furnish these services after being requested to do so, the injured employee may secure services at the expense of the employer, and the employer becomes liable under the act, and the fees and charges for these services are subject to the regulation of the commission. But it is only the provisions of the law that the commission has jurisdiction to enforce. *It is without power to enforce a contract between the employer and the physician employed by him.*

"Had the employer in this case refused or neglected to furnish medical services after being requested to do so by the injured employee, or under the circumstances of this case by some one for him, then the employee or some one for him, might have procured services, and the expenses thereof should have been included in the award to the employee, if approved by the commission, and the claim of the physician therefore would become a lien on the compensation awarded, and should be paid therefrom in the manner fixed by the commission. But the record disclosed that the employer did not refuse or neglect to furnish medical services, but to the contrary did everything possible to furnish the best medical skill obtainable, and requested the attending physician to procure the services of a specialist to perform the needed operation. Obviously, this created a contractual relation between the physician and the employer, and if the employer refused to pay for the services furnished, *the physician had his remedy by appropriate action in the proper court.* (Authors italics.)

"Wherefore the Supreme Court concludes that *the industrial commission was without jurisdiction to make the order or award complained of,* and the same is reversed and the cause remanded with directions to dismiss the claim."

In the foregoing case, the industrial commission overstepped its authority, by making an award when it had not the right to make the same, because of the contractual relation between the physician and the employer, and the insurance company appealed to the Supreme Court, and had the decision, or rather

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2. *Hoyt v. London Guarantee & Accident Co., and Nokomis Coal Co.,* 277 Ill. App. 92.

3. *Sullivan v. The National Car Coupler Co.,* (Ind)., 126 N.E.R. 494, 73 Ind. Ap. 442.

4. *Integrity Mutual Casualty Co., et al v. State Industrial Commission et al,* (Okla.), 209 Pac. R. 653

the award, reversed, thereby making it clear that the employer was liable for the amount of the physicians' fees—because of the contractual relation. Apparently, this case was appealed because the insurer desired to evade payment of the $600 surgical fee.

In another case,[5] where the indemnity insurance company which was carrying the employer's casualty insurance took exception to the amount of a physician's bill for fees, the Supreme Court of Oklahoma held that "the Commission is without jurisdiction to hear and determine claims of this character." In other words, the Court held that the industrial commission of Oklahoma is without jurisdiction to hear and determine the reasonableness or unreasonableness of claims for medical or hospital services, when they are based on a contract between the employer and the hospital furnishing services to an injured employee entitled to compensation under the provisions of the workmen's compensation law.

In other cases this same court said:[6] *"A physician treating an injured employee may resort to the courts for the collection of his claim, either against the employer who authorized his services or against the employee to whom they were rendered."* In the language of Amos and Andy, "Aint dat sumpin?"

"It was contended that the commission was without power to make an award direct to the doctor and the hospital. This contention is correct and if independent of the main case, the doctor has presented his claim or the hospital has presented its claim, we should say that the commission had no jurisdiction."

In still another case[8] the same Supreme Court said, "where the employer voluntarily furnishes medical services, it is a matter of contract solely between the employer and the physician, and *the industrial commission has no jurisdiction over such matter.* But where controversy arises, the parties are relegated to the courts for an adjudication of the matter."

Another and decidely important decision from Oklahoma[9] puts the matter in a slightly different light, and this difference is still more in favor of our contention. (Note the italicised part, which is thus accentuated by the writer.)

In affirming an award of the state industrial commission, in favor of an injured employee, the Supreme Court of Oklahoma said: "Under the workmen's compensation law and the construction placed thereon by the courts, the employer has a right to employ that agency through which treatment is secured. But when the employer delegates that right to the injured employee, as appeared to have been done in this case, it carries with it the right to do all legitimate and necessary things, such as to pay railroad fare, drug bills, hospital fees and nurse hire.

"More specifically, the court holds that, under the workmen's compensation law of Oklahoma, the employer has the right to name the physician to render medical treatment to an injured employee, and to direct where such employee shall go for treatment; and when the employee, without reference to the wishes of the employer, takes the matter in his own hands and secures treatment and contracts bills, the industrial commission has no authority, over the objection of the employer and the insurance carrier, to allow such bills against them. But this is a right that the employer can waive; and when his conduct is such as to reasonably indicate to the employee that he may select the physician or place of securing treatment, and the employee contracts for treatment, the employer and insurance carrier are liable for the outlay so long as the bills are reasonable and necessary.

"When the employer waives the right to direct the agency to render treatment to an injured employee, and the employer has knowledge that the injured employee is going out of the community for treatment and makes no objection thereto, such employer likewise waives proof that the bills are reasonable for the same class of treatment in the location in which the injury occurred. Furthermore, when the employer furnishes a physician for first aid treatment, and in the presence of the employer such physician advises the employee to go elsewhere for treatment, and the employer consents thereto and advises that it is the thing to do, and reports to the industrial commission that the injured employee has been sent to a hospital for treatment, the commission is authorized to excuse the employee from making formal request on the employer for treatment, and likewise excuse the employee from making proof that the bills paid and to be paid are reasonable and such as would have been charged a patient in the same situation in life as the employee, and in the community in which the injury occurred.

"When bills presented for payment are shown to have been paid in advance by the employee, along with others unpaid, contracted by him, the bills are themselves some proof of their reasonableness or unreasonableness, and when the conduct of the employer has been such as to justify the allowing of bills of that kind, they should be allowed unless they are in amount such as would shock the sense of justice of the commission or the court, on appeal. And when bills are presented by the injured employee, some of which

5. *Western Indemnity Co., v. State Industrial Commission et al,* (Okla.), 211 Pac. R. 423.

6. *Western Drilling Co., v. Beyer,* (Okla.), 280 Pac. R. 846.

7. *Robinson v. Taylor,* (Okla.), 244 Pac. R. 44, 47; 116 Okla. R. 131.

8. *Associated Employers Reciprocal v. State Industrial Commission,* (Okla.), 208 Pac. R. 798-801, 870 Okla. R. 16.

9. *Scruggs Bros. and Bill Garage et al. v. State Industrial Commission et al,* (Okla.), 221 Pac. R. 470.

have been paid and others of which have not been paid, and the bills are of a character properly allowable by the commission, the amount made by the commission should be in favor of the injured employee for the whole amount, and the unpaid creditors declared to have a lien on the sum awarded to the extent of the unpaid portion of the bills."

IN NEW YORK, the courts also appear to follow the same line of reasoning and argument.

In a suit[10] brought by a physician in New York, to recover the reasonable value of his professional services, which were rendered at the request and direction of the defendant's superintendent to several of its employees who were injured in the course of their employment, the defendant contended that under the workmen's compensation law the physician plaintiff's exclusive remedy to recover the amount of the value of his services was by application to the industrial commission, upon which it held the law imposed the duty of fixing the amount and value of the plaintiff's fees.

There was no dispute as to the rendition of the services, nor as to their reasonable value. The compensation law requires that an injured employee be given necessary medical services, when injured in the course of his employment. That duty primarily falls upon the employer. If he refuses the employee's request for such attention or neglects to furnish such proper service, the employee may select his own physician. Manifestly, therefore, it was held, the defendant here was legally obligated to furnish the services to its employees for the value of which the plaintiff sought to recover.

The question apparently at issue was, could the plaintiff enforce his claim by an action at common law, or was he by statute law restricted to an application before the industrial commission for the fixation of the amount of his fees? The Court found no authorities on this point, and was cited to none. It was held that the sentence in Section 13 of the Employer's Liability Act, providing that, "All fees and other charges for such treatment and services shall be subject to regulation by the commission as provided in Section 24 of this chapter, and shall be limited to such charges as prevail in the same community for similar treatment of injured persons of a like standard of living," *has reference only* to fees and charges incurred by the workmen for medical treatment where the employer refuses or neglects to provide such treatment. Section 24 provides for the approval of the value of the services by the commission and the inclusion of the charge as a part of the award, *showing that the charge incurred by the employee, and not the employer, is subject to regulation by the Industrial Commission.*

The Supreme Court said: "No attempt to regulate private arrangements entered into between the employer and the physician he might select is either expressly made or by implication to be spelled out of its provisions, and wisely so, for in no way could that be a matter of public concern. Nor is there any plan or schedule set forth for enforcement thereof.

"Recourse to a court of law therefore follows as the sole remedy, in the absence of a proper, expressed and comprehensive provision for the enforcement under the act. It is clear, therefore, that when the physician's claim is based solely on an agreement with an employer, and is not a part of the injured workmen's compensation, the industrial commission is without legal authority to fix the fee and enforce it, and the physician still retains his right to prosecute his claim in common law action." The judgment for the plaintiff, which had been rendered in the lower court, was affirmed.

Another New York decision[11] reads in part: "The primary purpose of the statute is not, however, to provide compensation for or to physicians, but solely to provide compensation to the injured employees for such medical service as the law permits them to procure at the expense of the employers.

"It does not, therefore, provide for any award to a physician but merely gives the physician a lien upon the compensation awarded to the workman, which shall be paid therefrom in the manner fixed by the commission."

THE SUPREME COURT of New Jersey in[12] an appeal from a judgment for $214 for services rendered by the plaintiff physician, confirmed the action of the lower court.

The action was to recover for services rendered an injured employee by an ophthalmologist. The testimony showed that the defendant casualty insurance company requested the plaintiff physician to treat an employee of a firm insured by the defendant company. The only question involved in the case was whether the plaintiff was bound by the workmen's compensation act, and the Supreme Court decided that he was not so bound.

The foregoing is only one of numerous examples wherein insurance companies are directly the interested parties, where they are trying by various and devious means to force physicians not under contract

10. *Feldstein v. Buick Motor Co.*, (N.Y.), 187 N. Y. Supp 417.

11. *Bloom v. Jaffe*, (N. Y. O, 157 N. Y. Supp. 926-927, 94 Misc. R. 222.

12. *Dias v. New Jersey Manufacturers Casualty Insurance Co.*, (N. J. O, 132 Atl R. 101.

with them to accept smaller fees than what the regular schedules specify. In most of the larger industrial centers, these insurance companies have groups of physicians who because of the volume of business referred to them, are willing to accept smaller fees than the regular amounts for services of like kind coming in at retail, as it were. Such instances as these, however, are not the kind that come in under this discussion.

In overruling the defendant's exceptions and motion for a directed verdict in a suit brought by a Westbrook, Maine, physician,[13] the Supreme Judicial Court of Maine upheld the contention that we are trying to promulgate.

In this case, the jury in the trial court brought in a verdict for the plaintiff physician. An employee of the defendant was injured through an industrial accident arising out of his employment. Under the provisions of the workmen's compensation act of Maine, the defendant, without contract except as implied from its status as an assenting employer, was bound to furnish or pay for medical aid to an extent determinable by the Industrial Accident Commission. This implied obligation of the employer is enforceable exclusively through petition to and decree of the commission. But the employer may bind himself by express contract to pay medical bills. Such contract is enforceable through the common law courts. No commission decree is necessary to give binding force to such a contract. Unless the contract expressly so provides, such decree cannot limit the extent of the obligation.

The jury found that the defendant had employed the plaintiff to attend its disabled employee, and expressly and unqualifiedly undertook to pay for such services. The question as regards the rendition of the services by the plaintiff was not raised and not brought up, nor was the justice or fairness of the amount of the fee questioned. The evidence justified the jury's findings.

The Supreme Court said: "The evidence was not manifestly erroneous. Nor was there any merit in the exceptions. The defendant through its exceptions relied on the doctrine of election of remedies. But the only remedy that the plaintiff has elected was the present suit. The petition to the commission was filed by the injured employee. That remedy was not open to the plaintiff. He did not attempt to invoke it. The decree of the commission was properly excluded. *That decree was the result of a proceeding between the employee and the employer. The plaintiff in this case was not a party to it.* As between the employee and the defendant, it determined the extent of liability for medical aid. It did not affect any obligation that arose from the express contract between the plaintiff and the defendant. Again, the defendant's counsel in his motion for a directed verdict set up the statute of frauds, which requires undertakings to answer for the debts of others to be in writing. But the claim of the plaintiff was that the defendant's promise to pay for the plaintiff's services was an original and not a collateral promise. The Statute of Frauds applies only to collateral promises."

A MINNESOTA decision,[14] while it is against the physician, and a reversal of the judgment rendered in his favor in the lower court, is none-the-less in conformity with the holdings of other decisions.

The plaintiff physician sued the employer for the amount of his fees, the same being for services rendered to an injured employee, who employed the physician. The physician had not been authorized by the employer to render the services.

The Supreme Court of Minnesota in its decision reversing the judgment for plaintiff said: "Some workmen's compensation statutes like those of California and New York make provisions for liens to physicians in the compensation adjudged, and specify how to secure them. In other states the law prescribes the different ways in which one may assert his claim against the employer. Under the Pennsylvania law, which imposes the duty on the employer to furnish medical treatment at whatever cost for the first 14 days after the accident, the court has held that where the injured employee was taken to the plaintiff for treatment with the defendant's consent, the plaintiff had a cause of action against the defendant on an implied contract. But the workmen's compensation act of Minnesota does not give a physician or surgeon who furnishes medical treatment to an injured employee a right of action for the value thereof against an employer who had not requested or consented to the furnishing of the treatment by such physician or surgeon. Nor in any event can an employer be held liable for such treatment, in the absence of a finding that he either consented thereto or that he refused or was unable to furnish needed treatment. Moreover, even were liability to suit conceded, it could not be maintained if brought after the time specified in the act. In this case the treatment was rendered in December, 1917, and this action was brought in August, 1919, which was clearly too late. Besides, the law as it stood when the injury occurred, afforded a remedy only in one proceeding and that to be instituted by the injured employee alone, if living, or by his dependents if death resulted. It surely was not contemplated that after a judgment for compensation,

13. *Ferren v. S. D. Warren Co.*, (Me.), 125 Atl. R. 392

14. *Beach v. Gendler*, (Minn.), 182 N. W. R. 607.

including medical expenses, has been entered and paid, the employer is still to be held liable at the suit of the different parties who may have furnished the employee medical treatment on his request and not at the instance of the employer."

It appears that the Mankato physician who was the plaintiff in the foregoing case, made two mistakes in the effort to recover for his fees. He waited too long before beginning action and he sued the employer instead of suing the employee who contracted the debt for the medical services. Evidently he did not know his rights, or knowing them did not enforce them.

A decision from the Court of Appeals of Georgia[15] is to the same or nearly the same effect, and follows the same line of reasoning presented in the foregoing Minnesota decision.

IN AFFIRMING a judgment in favor of Dr. Noer, of Wabeno, Wis.,[16] the plaintiff, for services rendered and furnishing hospital accommodations to an employee of the lumber company, injured under circumstances making the defendant lumber company liable for compensation under the workmen's compensation act; and notwithstanding that it was contended by the defendants, that the trial court had no jurisdiction over the case, the Supreme Court of Wisconsin said that "When the plaintiff presented his bill, payment was refused on the ground that it was excessive, and a request was made that the latter be referred to the industrial commission for adjustment, which was refused by the plaintiff.

"It was argued for the defendant that, the services having been rendered to an injured employee at the request of the employer, no liability existed on the part of the employer to furnish such services except by virtue of the workmen's compensation act, 'all of which was known to the plaintiff, exclusive jurisdiction was vested in the industrial commission to pass on the reasonableness of the charges made for such services, and that the plaintiff could not maintain an action at law to recover therefor. *This contention was unsound.*

"The workmen's compensation law deals exclusively with matters growing out of the relation of the employer and employee. The provisions of the act are binding on employers and employees electing to be bound by them, and on none others. *All except employers and employees are strangers to the act,* and their usual lawful rights and remedies are unaffected by it. True, it is made the duty of the employer to provide certain medical attention to its employees; but the act does not provide that he who renders such medical services at the request of the employer must submit the reasonableness of his charges in that behalf to the industrial commission for its approval and allowance. The physician rendering such services is no more deprived of his right to resort to the courts for the establishment and collection of his claim than though the services had been rendered to the employer personally. The fact that neither employer or employee, those for whom the act was primarily designed, is affected by its provisions against their consent, coupled with the further consideration that no method is provided by which a physician may consent to be bound by the terms of the act, would strongly negative the inference that the act was to have the effect for which the defendant contended.

"The provision in the act that the industrial commission shall have jurisdiction to pass on the reasonableness of medical and hospital bills in all cases of dispute in which compensation is paid, in the same manner and to the same effect as it passes on compensation, confers on the industrial commission authority to pass on and determine the amount which the employer shall pay the employee when the employer has failed in his duty to provide proper medical attention, which was provided by the employee himself. Under such circumstances the reasonable value of the services as determined by the industrial commission, measures the amount which the employer must pay to the employee for this item of compensation,*but the physician rendering the services is in no manner bound by such determination when he proceeds to collect from the employee.* His remedy in the courts is left unimpaired, and he may maintain his action for the amount of the value of his services as he conceives them to be. (Author's italics).

"Having discovered no legislative justification in the workmen's compensation act to deprive physicians, rendering services under the circumstances here presented, of their legal rights and remedies, the court finds it unnecessary to consider the question of the power of the legislature to confer on the industrial commission the exclusive jurisdiction for which the defendant contended."

THE WRITER believes that in addition to the foregoing decisions from the high courts of nine states, more could be found, but these were considered ample to prove what we started out to prove. We have shown conclusively and satisfactorily:

1. That, if employers authorize or give consent for physicians to attend injured employees, they—the employers—are liable, on contract.

2. That, if employers do not authorize or give consent for physicians to attend injured employees, phy-

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15. *Gainesville Limestone Co., v. Robinson,* (Ga.), 113 S. E. R 98.

16. *Noer v. G. W. Jones Lumber Co.,* (Wis.), 175 N.W.R. 784.

sician's fees may be allowed to the employees by decree of the industrial commissions; but that physicians so employed are not in any way bound nor obligated to accept the decree or the amount therein set forth unless they so desire, and, not desiring to accept, they may hold the employee for the amount of their fees, and have the right to sue for the same at common law.

3. *That the fixing by the industrial commission of the amount to be paid by the employer to the employee for medical services, does not and cannot fix the amount of the physician's fees in any interpretation or construction of the law.*

Reasoning from the foregoing reviewed and decided cases, it seems to the writer that we are fully justified in the statement that industrial boards or commissions and insurance carriers have no right or jurisdiction in the matter of fixing the amount of physician's fees for our services in industrial cases of any sort or character, and because we are not a party to the provisions of the workmen's compensation laws, we are not and cannot be controlled or regulated as regards the amount of our fees in this or any other particular by these bodies.

While the foregoing may appear to be unnecessarily verbose and long drawn out, the importance of the subject to industrial medicine is so evident that the writer believes the means are justified by the end

Medical Costs

THROUGH various sources of information and through personal experiences of various persons associated with studies regarding medical costs, the following conclusions have been reached regarding this subject: (1) the prevailing costs of medical care are so uneven as to be beyond consistent inclusion in any family budget; (2) one source of high costs rests in the duplication of overhead costs and capital investment in medical institutions; (3) it is difficult, particularly in small communities, to have competent physicians for every need; (4) laymen and lay organizations can not run our profession; (5) the burden of caring for the indigent sick is tossed in our lap, whereas the public should be financially responsible. We cannot now gauge our fees according to a sliding scale — the rich paying for the poor; (6) some application of the insurance principle has in a few instances been reasonably successful in paying the doctor, hospital, and nurse. Uncomplicated pay-the-hospital plans need not disturb the personal doctor-patient relationship which we still maintain is indispensable for the satisfaction. Such plans take many persons out of the indigent class, lessening thereby the need for philanthropy and invasion of public funds. This is not state medicine, which in the strictest sense implies utilization of money from taxation; (7) even if 90% of people were without the bounds of indigence, there would as yet be plenty of worry with the remaining 10%.—*Colorado Medicine.*

Improvement in Roentgenographic Technic

DR. N. S. FINZI, radiologist to St. Bartholomew's Hospital, at a recent meeting of the British Institute of Radiology described a new intensifying screen which permits of much more rapid x-ray exposure. The screen is made from refined zinc sulphate, and has been named "fluorazure" because of its intense azure blue fluorescence.

The previously used screens made of calcium tungstate have reduced the exposure time to about one-tenth, but it is said that with fluorazure the period is reduced to a third or a fifth of that when tungstate is employed.

Details obtained with the new screen are just as good as with the best tungstate screen, but the "graininess" which heretofore has prevented the adoption of zinc sulphide is not now apparent.

In chest work, contrasts are increased, and in this type of work the decrease in exposure time is most important. It is said that details of the portions of the lung surrounding the heart are much more distinct with one-fifteenth second exposure although a good roentgenogram can be obtained with one-hundredth second exposure. An interesting development of this new method is that direct cinematography of the chest can now be possible in x-ray work.—Foreign Letters (London) in *Journal of the American Medical Association.*

Industrial Eye Accidents in Canada

OF THE 824 cases of blindness due to accidents, which were registered with the Canadian National Institute for the Blind, 252 were due to accidents met in industrial occupations, while 149 were due to accidents occuring in play. Scissors, knives, shotguns and balls were the apparently harmless agents productive of blindness in the latter groups, while in the industrial occupations, explosions accounted for half of the casualties, and entry of foreign material into the eye accounted for one fourth. From a study of Canadian press clippings during the spring and summer quarters, it was found that the most frequent agents of eye accidents, apart from industrial causes, were guns, dynamite, catapults, arrows, fireworks, pucks, etc.—Note and Comment, in *The Sight-Saving Review.*

Industrial Medicine

Reg. U. S. Pat. Off.
Published Monthly by
INDUSTRIAL MEDICINE, INC.
For the Physician and Surgeon in Industry

Editorial Offices
844 Rush Street, Chicago, Ill.

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VOLUME 2 NOVEMBER, 1933 NUMBER 5

EDITORIAL

Dust Standards

IT IS of especial interest at this time to note that the health of workers in dusty trades and the establishment of standards of dust concentrations have been studied by the United States Public Health Service, a series of such studies having been recently completed with the publication of *Public Health Bulletin* No. 208.

There are now available studies relating to cement dust; siliceous dust (granite-cutting industry); carbon dust (anthracite and bituminous coal industries); vegetable dust (cotton cloth manufacturing) dusts from silverware manufacturing processes; and municipal dust (street sweepers).

The method of study is also of great interest because it should form a practical basis for similar studies conducted by other investigators throughout the country.

Sanitary surveys, with special reference to dust hazard were conducted in each plant studied; special occupational analyses were made during these surveys; dust determinations were made by the same investigator in all studies, thus giving an estimate of the occupational exposure, the upper and lower limits, and the changes which might take place, especially at different seasons of the year; general chemical and petrographic analyses of the dusts were made to ascertain the percentage of quartz in the various samples taken; sickness records were kept for each person in the various groups under consideration and information regarding the nature of illness and the duration of the case was thus obtained; a considerable percentage of persons in the various groups were given general physical examinations and those showing any evidence of lung pathology were given x-rays of the chest and sputum examinations where necessary. In some instances, special analyses were made of mortality data covering a long period of time and a few autopsies were performed and the findings included in the reports.

In the tabular summary of the degree of the dust hazard in the six studies (Public Health Reports 48: 1398-1400, November 17, 1933) the average dust count in millions of particles per cubic foot of air, the average percentage of free silica as quartz, other characteristics of dust, the degree of hazard under conditions as observed in each study, provide information which should be the basis for scientific decisions in the many puzzling cases which have recently come to the consideration of physicians, industrialists, and others interested.

In the minds of the lay public, an exposure to any kind of dust is commonly associated with the production of serious respiratory diseases. This belief, in fact, is the basis for erroneous decisions on the part of persons who are vested with power, at least temporarily, in the adjudication of legal cases or before other bodies. In this relationship, the studies of the U. S. Public Health Service in regard to the health of workers in dusty trades, should be of especial value, and particularly the statement made representing the pith of all this research work:

"The physical examination and x-ray findings in this series of studies clearly indicate an association between the amount and character of dust in the working atmosphere and the effect on the health of the exposed worker. Serious physical inpairment was noted only where the workers were exposed for long periods to large amounts of dust containing a high percentage of quartz. Where the dust concentration and quartz percentage were relatively low, there was found only a mild fibrosis which could not in most cases be regarded as due to the particular dust."

Letters to the Editor

"Bringing Medicine Out of Chaos"

To the Editor of *Industrial Medicine*:

AN ARTICLE in the October *Aesculapain,* Official bulletin of the North Side branch of the Chicago Medical Society, complains of the chaotic condition of the practice of medicine here in Chicago and asks: "Where will the National Recovery Act help in the chaotic condition in the practice of medicine in Chicago?"

If the practice of medicine is chaotic here in Chicago, it must also be chaotic elsewhere. If so, what is the cause and how may it be remedied? Is it not due, probably to a multiplicity of things, such, for example, as the public's increased knowledge of drugs and their uses and the ease with which the so-called harmless drugs may be obtained at drug stores. Manufacturing chemists are placing their drugs on the market under trade names and advertising them as easily obtainable at all drug stores; and manufacturers of patent medicines are flooding the market with their nostrums.

Innumerable self-appointed social service or welfare workers and free dispensaries have substituted themselves, to the great discomfort and dismay of physicians everywhere. I have information that welfare workers here in Chicago are considering forming a union to get a pay boost. They desire a 35-hour week and their platform recommends a minimum salary of $90 to $150 a month with automatic yearly increase of 10% for the first five years. In many instances visiting nurses make calls which should be made by physicians. We may have been somewhat careless in many matters of this kind, but some of the loss may be regained if we will work hard.

Fifty years ago the public relied on physicians in all matters of health. In those days physicians were scarce; in most localities specialists were not known; the physician was one of the most respected and loved citizens. Today he has been practically divested of his professional standing and in some instances, indeed, has become, according to rumor, the object of actual charity.

It is not probable that the physician is also partly to blame for this chaotic condition by having unwittingly prescribed trade-name medicines and having become lax in allowing his patients to obtain refills promiscuously from the druggist, thus automatically passing from the picture.

For. obviously enough, the public has taken advantage of the indifferent attitude of the physician, and has been sharp to see that by consulting the druggist for refills, the fee for a second visit to the physician could be avoided. And this has only widened the gap between patient and physician. And, too, the public became aware that druggists are familiar with the habits of physician and the medicines they prescribe, so that, unconsciously, more friendly personal and business relations developed between them to the detriment of the physician. On account of economic conditions drug stores carry far more commodities now than they used to, and that fact, of itself, has brought druggists in closer contact with the public.

Of course, there is an increase in the number of physicians. Furthermore the means of transportation have so developed that it is now possible for a physician to visit a larger number of patients than ever before. The latter condition would have the tendency to reduce the necessity for so many physicians in the community.

It appears that these and perhaps other reasons are quite sufficient to produce chaos in the practice of medicine. At least no one is benefited by such a condition; as a matter of fact society is harmed by it. Is it not possible, therefore, that a new deal can be instituted whereby most of these harmful existing conditions may be remedied, with society reaping the benefit? Possibly the principles of the National Recovery Act are applicable. But so far as a code might be concerned, it would be useless for physicians to sign unless others would do likewise.

If the sale of a package of tooth paste is worthy of the slogan "See Your Dentist Twice A Year", a box of acetanilide compound purchased at the drug store is surely important enough to carry a danger sign: "See your physician before taking any." If we can return to the old alliance where the patient, pharmacist, and physician cooperate again in the proper manner, chaos in the practice of medicine would have a tendency to disappear, both in Chicago as well as elsewhere.

Perhaps the medical profession is too slow for its own good and too deliberate in its actions. Can we not take a cue from our fellow specialists, the dentists? They appear to be awake to their obligation. Should we copy? According to documentary evidence in hand the University of Chicago Press is publishing a book entitled "Diet and Dental Health", by Milton T. Hanke, and the California Fruit Growers Exchange has taken steps to distribute it. Why "Diet and Dental Health?" Why not "Diet and General Health?" Or "Mental Health." Why "Dental?" The answer is easy and also significant. Fancy this on the air: "Bring Home a Box of Groves Laxative Quinine Tablets See your Druggist," etc., and many others too numerous to mention. The street- corner torch light orator with his patent medicines has long since become extinct, but does he not exist today in the same way but under a different guise?

If the practice of medicine is chaotic, is it not largely our own fault? Is not the remedy simple? Physicians have the world in their hands, and if they do not take advantage of it, it is just too bad. So far, they have not lived up to their capabilities. It is time physicians were standing up for themselves and reclaiming what they have lost. Let us see if they can improve themselves in the future. They should fear "The Big Bad Wolf" of lay prescribing.

—EARL L. VERNON, M. D.

Industrial Medicine Digest

Excretion of Lead

DRS. FREDERICK B. FLINN AND ADELAIDE ROSS SMITH, *in the Journal of Industrial Hygiene,* (May, 1933):—It has previously been demonstrated that large doses of viosterol cause a hypercalcemia and increased elimination of calcium from the body. Subsequent work led to the belief that excessive doses of viosteriol should likewise increase the excretion of lead in cases of lead poisoning.

Experiments were, therefore, conducted to determine the effects of large doses of viosteriol on lead excretion in cats.

In this instance, two series of six cats were used, the details being reported in the original article.

In discussing the results of this work, the authors stated that in both experiments the excretion of lead was immediately increased after the administration of viosterol.

In the first experiment the viosterol cats excreted more lead than the control group in each of the five 3-day periods. The difference between the groups was greatest in the second period when the viosterol cats showed a lead elimination 10 times greater than the control group. In the second experiment the average daily excretion of lead per cat rose sharply in the first period after viosterol was begun and reached a peak in the fourth period. At the peak the amount of lead excreted per cat was 37 times greater than it had been in the control period.

Since the cats in the experiments described were on a low calcium diet the increased elimination of lead following viosterol is probably to be explained as accompanying an increased loss of calcium from the body. The calcium excretion was not determined in these experiments but reference has already been made to studies showing that the metabolism of lead parallels that of calcium and that calcium excretion is increased by large doses of viosterol with a low calcium diet.

Taylor, Weld, Branion, and Kay point to the close similarity between the effect of excessive doses of irradiated ergosterol and the parathyroid action and offer the explanation that the effect of ergosterol is due to direct stimulation of the parathyroid tissue. It is interesting to note that since parathyroid extract has been found by Hunter and Aub to be an effective deleading agent, similar action by viosterol bears out the idea of relationship between the two stressed by these authors.

These investigations show that large doses of viosterol increase the elimination of lead from the system in cats and they suggest that viosterol may prove an acceptable form of therapy in cases of lead poisoning after exposure to lead has ceased.

Financial Losses and Mental Illness

DR. WILLIAM C. MENNINGER AND LEONA CHIDESTER, *in The Journal of the American Medical Association,* (May 6, 1933):—The object of the present study was to: (1) determine the frequency of (a) real and (b) delusional (fancied) economic loss as a precipitating factor in the production of mental illness; (2) determine the role of this financial loss in the patient's illness, i.e., to determine what special psychologic significance it might have; and (3) determine the influence of the present economic depression on the mental health of the populace as judged by an intensive study of approximately 650 cases of mental sickness of various types.

A summary of the results gave the following findings in this study:—a total of 646 cases of "functional" mental illness (psychoses and psychoneuroses) were reviewed, and 38 instances (5.8%) in which financial losses occurred as a causative factor in the illness were found. In 272 cases seen during the years of prosperity from 1926 to 1929, 6.2% of the patients had an economic reversal as the precipitating agent in the illness. In 374 cases seen during the economic depression, 5.6% of the patients gave a history of economic reversal as a factor in causing the illness. Of the psychoneurotic cases, 4% of the patients had such a history during both periods, while of the psychotic cases, 8.5% had such a history during the years of prosperity, compared to 6.2% during the years of depression.

The conclusions reached were:—(1) a smaller percentage of cases of mental illness showing a direct causal relationship to financial loss occurred during a period of national economic depression than during a period of national economic prosperity; (2) financial losses, whether actual or fancied, represent a very small percentage of the total number of precipitating factors of mental disease, and thus play a minor role as causal factors; (3) economic loss as displayed in the conscious reactions of the mentally sick patient in many instances carries a surcharge emotional value far exceeding the actual value. Often there is no actual loss, but a delusional loss or an anticipated loss which differs in no way in its psychologic significance to the patient from a real loss; and (4) from intensive individual case study, it is suggested that the less frequent occurrence of mental illness associated with personal financial loss during the economic depression may be explained by the fact that the actual situation of economic stringency serves to satisfy the unconscious sense of guilt which under normal economic conditions has less opportunity for propitiation.

Carbon Monoxide Poisoning — Case Report

DR. MILTON A. BELL, *in The Journal of the American Medical Association,* (May 6, 1933):—Various reports regarding the use of methylene blue in carbon monoxide poisoning have stimulated interest in this new method of therapy. The following case was reported by the author:

A white man, aged 53, brought by the police to the accident ward, March 3, 1933, at 12:20 p.m., had been found at noon in a room filled with illuminating gas; he was unconscious when found and had left a note stating that he was "ending it all," and timed the note at 11:05 A.M.; four jets of a gas range were found wide open. On admission to the hospital the patient was unconscious and cyanotic, with cold extremities; a feeble pulse could be palpated. He was immediately placed in shock-position and a mixture of oxygen (95%) and carbon dioxide (5%) was administered, and caffein sodiobenzoate, 3¾ grains (0.25 gm.) was given by hypodermic injection. Up to this time the patient was totally un-

conscious, did not respond to painful stimuli and did not move his head or extremities. The pulse wavered in quality. At 12:25 P.M. we started the intravenous injection (by syringe) of the warmed methylene blue solution. When about 30 cc. had been given, the patient began to move his head and then his arms and legs, so that he had to be restrained. The injection of the dye was completed without any difficulty, taking about three minutes for the 50 cc. The pulse had picked up considerably. At one o'clock the patient responded with a mumble when questioned and moved a little in response to painful stimuli. At 2:30 he was examined by a neurologist, who made the following report: "The patient was stuporous. The extremities were in a hypertonic state in the proximal parts and hypotonic in the distal parts, as the hands and feet. The patient showed a rather interesting phenomenon, a cataleptic involvement in the upper limbs. These parts were molded in various positions and remained that way for some time. After about five minutes of irritation, the patient asked 'Where am I?' and responsible to mild commands, as raising the arms and protruding the tongue. The pupils responded to light. There were no signs of paralysis of any of the limbs. The reflexes were present bilaterally. There was no Hoffmann or Babinski sign. Some increased tension in the muscles of the neck was noted. Impression: it will be interesting to follow this case as to the neurologic picture. The cataleptic signs and the hypertonicity may advance to a complete decrebrate rigidity picture. The treatment with methylene blue is a comparatively recent method and it will be instructive to observe the results."

By six o'clock the patient was mentally clear and answered questions intelligently. Cyanosis had disappeared. He was transferred at this time to the medical ward. Oxygen and carbon dioxide inhalations for five minutes every hour were kept up for 24 hours. Atropine sulphate, 1/150 grain (0.0004 gm.) was given every fourth hour the day after admission because of the appearance of rales in the chest; this condition cleared up. The patient continued to improve. No ill effects were noted from the use of the methylene blue solution. The neurologic signs entirely disappeared, and the patient was discharged as cured, March 10.

Laboratory studies were as follows:—On the day of admission the blood sugar was 0.172%; urea nitrogen, 15 mg. per hundred cubic centimeters; plasma carbon dioxide combining power, 46 volumes per cent; chlorides, 450 mg. Unfortunately, no test for carbon monoxide was done at the time of admission. By the next morning the blood sugar had fallen to 0.1% and the carbon dioxide combining power was 53 volumes per cent. On the third day the blood was shown to be free of carbon monoxide (qualitative test). An electrocardiogram done on the third day showed depression of myocardial function (T waves of low voltage).

It might be of interest to add that about a year ago a patient, with a history very similar to this one at the time of admission never regained consciousness, developed a picture of decerebrate rigidity (of which moving pictures were taken at the time) and died three days after admission.

Fractures of the Humerus

DRS. WILLIAM R. CUBBINS AND CARLO S. SCUDERI, *in The Journal of the American Medical Association,* (May 20, 1933):—This is an analysis of a group of 500 patients with fractures of the humerus in which it was possible to study the various findings and draw some definite conclusions.

Three hundred and sixty-five, or 73% of the fractures were in males, while the remaining 135, or 27%, were in females. This relationship corresponds with that reported by Gurlt, who gave the figures many years ago at three to one.

The average age of all the patients with fractures of the humerus was 36.2 years. The youngest patient was four months of age, and the oldest, 84 years.

Fractures of the surgical neck composed almost one third of all fractures of the humerus. One hundred and fifty four were of this type, or 30.8%. One is surprised, off hand, at such a figure. The average age of these patients was 50.3 years, 90.8% being over 16.

There were 152 fractures of the shaft of the humerus, only two less than those of the surgical neck. These composed 30.4% of the total. Twenty-two, or 4.4%, were in the upper third; 109, or 21.8%, in the middle third; and 21, or 4.2% in the lower third.

The conclusions based on this study were as follows:

1. Fractures of the upper two thirds of the humerus are more common in adults, while those of the lower third are more common in children.

2. Fractures of the surgical neck of the humerus are more numerous than any other one type of fracture of the humerus (in our series).

3. Open reduction was required in one of every 18 cases.

4. Non-union and delayed union occurred in one of every 33 cases.

5. Radial palsy was found in one of every 34 cases of fracture of the humerus, or in one of every eight cases of fracture of the middle third of the humerus.

6. Complications of some type occurred in one of every nine cases of all fractures of the humerus.

7. Fractures of the surgical neck and the shaft of the humerus were best treated by: primary immobilization, or traction, for from three to four weeks; secondary immobilization with Middeldorpf's triangle, an airplane splint or a Velpeau bandage for two weeks; tertiary immobilization with a sling for one week, and total immobilization for from six to seven weeks.

8. Fractures of the greater tuberosity do not require 90 degrees of abduction, except in rare cases.

9. Supracondylar fractures give the best end-result if treated in maximum flexion and complete supination.

10. Foreign bodies should be avoided as much as possible in open reduction.

11. The value of preserving the posterior periosteum in open reductions for fractures of the shaft of the humerus should be kept in mind.

Industrial Surgery

DR. R. F. PALMER, *in Southwestern Medicine,* (May, 1933):—The author is the Medical Referee of the Arizona Industrial Commission and contributes his experience of many years' association with this type of work.

It is necessary that physicians cooperate with the commission, (1) by giving adequate and careful first aid; (2) by making a thorough analysis of the accident and a thorough examination of the injured; (3) by making a clear and comprehensive report to the commission; (4) by consulting freely with the medical referee, either in person or by correspondence; (5) by treating your patient so as to obtain the best possible physical and functional recovery at the least possible medical cost (consistent with efficient treatment) and in the least possible time.

The duties of a medical referee as noted in Rule XXIV. relate to the following duties and functions:

1. He shall examine, classify and file

all surgeon's accident treatment and progress reports.

2. He shall contact, in personal consultation or by correspondence with the attending surgeon, all cases requiring special consideration and shall make recommendations to the commission thereon.

3. He shall examine and report on all cases referred to the industrial commission for compensation and make recommendations thereon.

4. He shall act as medical consultant to the industrial commission on all things pertaining to the industrial cases in the state.

5. He shall, in general, act as a balance wheel between the industrial commission and insurance carrier, the injured workman and the industrial surgeon.

Rule XXV. provides that on and after May 1, 1933, all surgeon's reports and all correspondence relative to the treatment and progress of and all final reports and bills on industrial cases shall be mailed with a carbon copy to the Medical Referee, Industrial Commission of Arizona, 607 Professional Building, Phoenix, Arizona.

A schedule of fees is included in this article, setting forth general items regarding visits, consultations, and other services, and also a list of special items.

Lead in Air of Streets and Shops

J. J. BLOOMFIELD and H. S. ISBELL. *in The Journal of Industrial Hygiene,* (May, 1933):—In this study the lead content in the air of city streets, automobile repair shops, and also non-lead-using industrial establishments conducted in 14 large cities showed that small amounts of lead are normally present in the atmosphere of these establishments and at congested street intersections.

Samples of air were obtained with the impinger apparatus using distilled water as the collecting medium. These averaged about eight cubic meters in volume and were all taken at the breathing level. Throughout the study care was exercised to preclude the possibility of contaminating the samples with lead. Containers were of the lead-free variety and all reagents used in the chemical analyses were tested for lead content. In addition, control samples were analyzed with each set of samples obtained in any one city. The method of analysis was the one used in the investigation of tetraethyl lead.

In all, 78 samples were analyzed; 25 of these were taken in automobile repair shops, 28 in streets, and the remaining 25 in various types of industrial plants in which lead compounds, as such, were never handled. The results showed that about 86% of the samples obtained in the three different kinds of sampling places contained less than 0.2 mg. of lead in 10 cubic meters of air and that in the case of the street and industrial samples all the results were less than 0.4 mg. Only two samples (obtained in automobile repair shops) contained more than this amount.

This study brings out the fact that minimal amounts of lead are normally present in the atmosphere of industrial establishments (0.10 mg. per 10 cubic meters generally and 0.13 in automobile repair shops) and congested street intersections (0.09 mg.). This fact may in a measure account for the presence of lead in the excretion of persons with no history of industrial exposure to lead compounds.

Toxicity of Osmium Tetroxide

DR. F. R. BRUNOT, *in The Journal of Industrial Hygiene,* (May, 1933):—After reviewing the literature on osmium tetroxide, the four principal uses to which the element osmium is put are mentioned as follows in the order of their importance: (1) fabrication of pen tips; (2) as a fixing and staining agent in pathological and histological work; (3) in the manufacture of electrical contacts; and (4) in finger printing.

Experimental work was done on rabbits, the animals being exposed for 30 minutes to varying concentrations of osmium tetroxide in an airtight glass box of 190 liters capacity. The only variation in the procedure was the quantity of osmium tetroxide used, the animal being placed in the box, the ampoule of osmium being cracked open inside the chamber and placed in a watch glass on a hot plate, the door sealed and the hot plate and fan turned on. After complete vaporization the hot plate was cut off while the fan was allowed to operate.

The principle effects observed were purulent bronchopneumonia, moderate cloudy swelling and granulation of the tubular epithelium of the kidneys, and edema and discharge from the eyelids, associated with corneal opacities.

The author summarizes his paper as follows:—the main object of this paper is to point out the hazard of exposure to the fumes of osmium tetroxide, and to stress the fact that heating metallic osmium, or its oxides, in air, should be undertaken only with full appreciation of the attendant dangers.

Protection ordinarily can be afforded by a reliable down draft, preferably through a spray of 10% sodium hydroxide, which alkali, absorbing the oxide, recovers enough osmium to make such installation of economic advantage. Where only minute quantities are encountered, protection of the eyes by airtight goggles is enough; for larger quantities a gas mask with an "all service" canister affords safegaurd.

Fractures of the Femur

DR. J. H. DORMAN, *in Texas State Journal of Medicine,* (May, 1933):—This discussion relates particularly to the management of fractures of the femur with reference to some mistakes made in the treatment.

Of particular interest are the causes of non-union which may be listed:

1. Failure to recognize interposed tissue.

2. Failure to secure satisfactory reduction.

3. Delay of early reduction in uncomplicated cases.

4. Failure in uncomplicated cases to maintain reduction with proper position of fragments until union is solid, due to: (a) slipping in cast; (b) tongs shifting; (c) shifting from one method of treatment to another; (d) bowing after traction or splint is removed; and, in many instances, (e) the failure to use a Thomas ambulatory splint.

5. Occurrence of infection in: (a) most compound fractures; (b) all open reductions; (c) all tong and pin wounds; (d) skin in skin traction; and (e) hematomas after open reduction.

Non-union may also be due to preventable causes, which are usually due to: (1) delay, due to associated injuries, in initiating proper reduction; (2) lack of cooperation on the part of the patient; (3) associated disease; (4) absorption of neck of the femur; (5) certain epiphyseal fractures; (6) old fractures of the hip in which the patient delayed seeking medical attention; and (7) excessive callus.

Deformities resulting from non-union are: (1) over-lapping, over-riding; (2) angulation or bowing; (3) rotation of the lower fragment; (4) excessive callus; and (5) shortening.

Graduation of injury in fracture cases is classed as (1) functional; (2) anatomical; and (3) occupational.

THE BULLETIN

of

The American Association of
Industrial Physicians and Surgeons

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Tuberculosis and Dust

By DR. HENRY R. M. LANDIS

THIS SUBJECT is rather a curious one. Within the last five years (and I am not certain that it does not apply even today) pneumokoniosis rarely if ever figures in either morbidity or mortality results. It is buried under all sorts of guises—tuberculosis, chronic bronchitis, pleurisy, etc. Furthermore, it has more of a local interest. I mean local in the sense that there are men living in localities who by no possible chance practically ever run into this condition which in other localities is extremely common.

I am reminded that about 13 years ago I gave a clinic before the medical students on pneumokoniosis, and didn't give the matter any particular thought until the morning, when I thought it would be an easy matter to get sufficient x-ray films from our x-ray laboratory to illustrate what I had to say. To my amazement, when it came time to get them, although the Peter Brighton Hospital had been in operation for eight years, they had just one pair of x-ray films showing pneumokoniosis. That was from a Spaniard who had worked in copper mines in Chile and who had been admitted to the hospital for something else, but the pneumokoniosis had been discovered accidentally.

It so happens that this condition with me is of a monthly occurrence. For the past 25 years I have been on the visiting staff of White Haven Sanitorium which is situated on the edge of the anthracite coal fields. At the present time, and for the past four or five years, all of the cases of tuberculosis of Luzerne County are sent to that sanitorium. It doesn't make any difference whether they have tuberculosis or not, the astonishing thing is that 60% of the miners I sent in under the belief they had tuberculosis are suffering from plain, straight pneumokoniosis. Every time I go up there—every two weeks—I find committed to my service from one to three of these miners.

This whole question of association of tuberculosis with coal miners is still a matter of dispute. One of the very first pieces of work done on this subject in this country (and there was relatively little known about pneumokoniosis in this country up to 20 years ago; very few people paid any attention to it) was that of Wainright, of Scranton, who published a clinical and pathological study of this condition. He came to the conclusion that tuberculosis seemed to be below the average, that is, that this condition, pneumokoniosis, did not seem predisposed to tuberculous infection. That matter is still open to dispute as to whether coal miners are more apt to develop this than other men.

We know, on the other hand, that in the gold mines in the Rand in South Africa tuberculosis has a tremendously high incidence, dealing with pure pneumokoniosis which has a very rapid development, whereas under the old conditions coal miners evolved this condition relatively slowly.

Some seven or eight years ago I published a little primer on the question of pneumokoniosis in the anthracite mines. A well-known coal operator in this city met me one day and said he had read this article with a great deal of pleasure because he always contended that coal miners were no more apt to develop tuberculosis than anybody else. I replied that that was a question still open to debate, but it was quite certain they got something worse than tuberculosis inasmuch as they could not get rid of it—and the conversation stopped very abruptly. He wasn't at all interested in the fact that this other condition was to the front.

It has been current, certainly during the last 20 years attention has been paid to this subject in this country, that tuberculosis has always been associated in the minds of people in general and particularly medical men with the fact that these people develop tuberculosis with undue frequency. As I say, certainly the experience in South Africa would seem to indicate that. I think it is questionable so far as coal miners are concerned.

Hayhurst, of Ohio, in examination of nearly 1000 sandstone quarriers, found that tuberculosis did not occur in that group with any more frequency apparently than occurs in the general population.

On the other hand, in contrasting coal miners with granite cutters, they all evolve their pneumokoniosis, or did until recent developments, in about the same time. The evolution is about the same—a matter of 10 years elapsed before they showed any marked changes in the lungs and it was usually a matter of 25, 30 or 40 years before they got sufficient damage there to incapacitate them. Jarvis makes a statement that the large majority of these granite quarriers died of a complicated tuberculosis.

We ought to have more exact information so far as miners are concerned because, as matters stand, we are getting a sort of false picture. In order to get a complete picture, one ought to be able to make a survey of a large number of these, thousands of them. We are seeing only the ones that are obviously ill, whether of complicated tuberculosis or otherwise. We are seeing only the end results, not all the gradations that occur, and of many of these people long before they become incapacitated we know relatively little.

If you were to go to Wilkes-Barre General Hospital, into the x-ray laboratory where many of these men are x-rayed as a matter of routine—where they are admitted for fracture of the leg or arm or minor disaster — men who have no respiratory symptoms at all at that time— you would be perfectly amazed and appalled at the number of them who show perfectly definite changes in the lungs.

The subject is entirely aside from the fact of its incapacitating men—the fact that this dust hazard is a perfectly

definite one, and the absolute confusion that exists in this country as to what ought to be done.

Practically all of our knowledge of pneumokoniosis occurs from English writers, Holland writers, and others, where they have been observing this for the past century. They have got to the point where the British Workmen's Compensation provides for any man who has died as a result of pneumokoniosis or complicating tuberculosis, or who has been incapacitated or who, it is deemed, has sufficient damage in his lungs to make it inadvisable to continue. In this country two or three states have recognized this, and the rest of them pay no attention. I think only within the last two years the attempt was made in New York State to pass a law covering this situation which was defeated. That is the chaotic condition in which the situation rests at the present time.

In the last five years a tremendous amount of study has been devoted to the question of so-called dust centers. I have the feeling, which I share with others, that the discussion as to the type of dust cell, whether it is epithelial or endothelial, is purely academic; it is of scientific interest to know the specific sort of cell.

THERE ARE just two fundamentals in this problem as I see it. A man or woman is exposed to inorganic dust and then x-rayed. He, or she, shows what has come to be pretty definitely known as a fairly characteristic picture. I should not say fairly characteristic, but practically characteristic, especially to a Roentgenologist who has had any experience whatever in examining films of people engaged in the dusty trades.

So far as the complicating tuberculosis is concerned, even the shrewdest reader of x-ray plates will be deceived very often as to whether there is a complicating tuberculosis or not in a given case, so that you are driven back in many cases, though some are perfectly obvious. There is no difficulty in telling tuberculosis superimposed, from the x-ray picture, but in many of them it gets down to the question of sputum examinations. If the sputum is consistently and repeatedly negative, you are safe in assuming you are dealing with a plain, straight case of pneumokoniosis. Perhaps in autopsy it will show a small focus which is incidental and has no bearing on the situation whatever.

We have a man at the White Haven Sanitorium now who has had four years experience in examining a very large number of these cases of pneumokoniosis and only within the last six months in spite of the fact that he has seen so many of them, he had one case in which he said there was complicating tuberculosis, and repeated sputum examinations failed to establish it. Another which he said showed no evidence of tuberculosis was taken later and showed tuberculosis.

So you cannot always be certain. Pancoast, who, I suppose, has had as wide experience — certainly nobody in this country and I doubt if the South Africans have had a much greater experience in the reading of x-ray films from people engaged in dusty trades —admits perfectly freely that there are a good many instances in which you cannot tell from people engaged in dusty trades — admits perfectly freely that there are a good many instances in which you cannot tell from your picture alone as to whether you are dealing with a straight pneumokoniosis or a complicating tuberculosis. It always gets you back to this question of sputum. In all these cases the sputum ought to be persistently searched for tubercle bacilli.

As far as the miners are concerned, the fact that they come into the sanitorium almost invariably under-weight and are fatigued, and sometimes have a little fever and then rapidly gain in weight and rapidly lose their fatigue, I have come to look upon somewhat as an academic factor. For some years the question of work in the mines has been a rather uncertain one, and I think they probably come in undernourished by reason of economic factors, and when you put them to bed and get them thoroughly rested and well fed, they naturally pick up weight irrespective of whether they have complicated tuberculosis or not.

MY EXPERIENCE has largely been with anthracite miners on the one hand and potters on the other, with a scattering experience in a good many of these dusty trades. Some of you may be familiar with the fact that just at present there is a tremendous amount of interest in the question of asbestosis. This has finally been found to be a most prolific cause of producing pneumokoniosis and the literature for the last four or five years has been quite full of it. They do not get it in the quarrying, but practically as far as I understand it, almost invariably in the manufacturing.

As far back as 1916 Pancoast and I examined a considerable number of asbestos workers and a few of them showed a first stage, and most of them showed what we understand as the secondary stage of pneumokoniosis. Pancoast told me recently he has determined to abandon this classification introduced by Lancey.

In the early x-ray studies of this condition in the first, second and third stages, which are really convenient for clinical and practical purposes, I question whether he ought to abandon it. Pancoast feels that it ought to be determined from an x-ray picture, and you have what you call a lymph, vascular bronchial and interstitial type.

I might say just a word about organic dusts. Many of the textbooks dealing with industrial medicine even today perpetuate that old tradition that all dusts are capable of producing pneumokoniosis. So far as I know there isn't a single organic dust that is in any way capable of producing in the lungs changes that are pathological.

In those individuals exposed to dust, in other words, cotton, silk, wood dust, animal hair, any of these various organic dusts never penetrate beyond, so far as I know, the barriers that guard the upper respiratory tract, and certainly if they do, they don't produce in any way, shape or form what is almost characteristic of individuals who are exposed to the inhalation of inorganic material.

Here again there is another dispute as to whether this fibrosis which, of course, is the outstanding feature of pneumokoniosis is a result of chronic irritation from these dust particles or whether it is due to some chemical, colloidal reaction. That is under dispute. For practical purposes, I think, it is more or less academic because you are driven back to the point from a perfectly practical point of view.

If people are exposed to a given form of inorganic dust, do they show any changes in the lungs? If they do, the change is more or less unalterable. What cells play a part or whether it is a chemical reaction or one of irritation, as I said, is just to clear up the thing from a scientific point of view and doesn't alter the subject from a practical point of view at all.

The interesting thing is that a roentgenologist who is out of these local spheres where you see the dust cases, particularly in the second stage

where it looks as though you had thrown a handful of snow flakes against the film, almost invariably makes a diagnosis of miliary tuberculosis. In the third stages they will almost invariably make a diagnosis of advanced tuberculosis. It is not to be wondered at, because when you see these films it is not surprising that these mistakes can be made.

There is another curious thing and that is that on examination of the chests of these people, from the standpoint of physical diagnosis, in spite of the fact that the x-ray film will show the most dreadful lot of changes in these lungs, from the physical signs you get next to nothing. You may not get a single, solitary thing. It is bilateral, and the question of whether these lungs are expanding as much as they should is out of the question. It is very difficult to evaluate them. The one thing you can do, knowing the type of dust and the length of exposure, is to predict the amount of damage you are going to find.

IN THE ANTHRACITE regions the problem has been complicated within the last decade by the introduction of what they call a jack hammer or handle. Up to seven or eight years ago the type of pneumokoniosis you got with miners took anywhere from 15 to 30 years to evolve. Since they introduced the air-compressed drill without a water spray at the end, you are getting men incapacitated in sometimes three or four years, and if you have a man with a moderate amount of pneumokoniosis from the old system and he starts using the jack, it will accentuate it to a perfectly tremendous degree.

I have (there is no tuberculosis infection here) a small piece of the lung of a coal miner. Seven-tenths of his lung space on both sides was reduced to the consistency of a piece of tissue. That is just as hard as a piece of leather, absolutely devoid of any breathing space whatever. The small amount of lung tissue that was not involved was unphysematous. Seven-tenths of both lungs were exactly like that. That man was sitting bent over. To look at him, he had a ruddy color and gave no impression of being ill. He didn't even look like a heart case. His face was quite highly colored. He died about a week after he was admitted to the sanitorium. As I say, the condition of his lungs was almost unbelievable.

I think back as far as 1894 there was reported from the Cobalt mines in Silesia what they termed at that time, before there was this differentiation, the high incidence of sarcoma of the lungs among those miners. Those who had seen pneumokoniosis wondered. They were skeptical about the whole thing because in all these cases of pneumokoniosis — I don't know how many thousands of films we had—we had never seen a single, solitary instance in which, in spite of the irritation and development of fibrous tissue, there had been complicating malignant disease of the lung.

ABOUT FOUR years ago we had another report in which it was perfectly definite as these men were autopsied; there was the most amazing incidence of primary cancers of the lung; evidently what they originally described is probably what they are finding now as carcinoma. The incidence is really startling. It is the only instance of ore metal mining that I know of in which this has happened.

It is perfectly obvious that the ordinary dust itself has no influence. It is a question whether the cobalt itself has not added something that produces this change. At any rate, this man was autopsied and he showed nothing but an ordinary late secondary stage of pneumokoniosis. There was no evidence of primary tumor or tuberculosis.

The impression that I get is that coal miners certainly do not show the same incidence. As I said, Hayhurst, in Ohio, found among sandstone cutters the incidence of tuberculosis no more frequent than among the general population. Then there are the results in Barry, Connecticut, in which the evolution of pneumokoniosis is almost parallel with that of potters and coal miners. Jarvis found a tremendously high incidence. The ultimate end of a tremendously high proportion was a pulmonary, complicated tuberculosis.

Of course, I think many of you are familiar with the fact that more and more studies are coming out all the time. There have been three or four in the last year. A very interesting and extensive study was made by the Public Health Service of the United States. A man from Baltimore has written in (*Journal of Internal Medicine*) what amounts to a monograph which is, as far as I know, the most complete review and survey of this whole question up to the present.

I don't think there is any doubt that the ultimate solution of this thing really should be prevention, and preventive medicine should be put in. There is probably going to be a good deal of disagreeableness going on—the question of law-suits. I have come to the conviction recently that the whole solution of this problem is only a matter of law, quibbling on what might be or might not be. A question of everybody getting together and trying to evolve some method which will render reasonably safe men who are exposed to this hazard.

The picture is changing, changing in this way: A great many of the people began writing on this subject 15 years ago. As far as this country is concerned, I am firmly convinced that if a man is exposed to inorganic dust, there is a certain amount of damage and you take him out. Now we have found out that once he has gotten an inorganic dust into his lungs, removing him from that does not guarantee that fibrosis isn't going to increase even after he is removed.

We have a man at the sanitorium now who has been entirely removed from the inhalation of inorganic dust for a year and his lungs are worse today than they were a year ago. In other words, the process has advanced. He has more fibrosis now than he had a year ago.

I think the only safe rule for anybody, over and above any preventive measures you put in, in the way of trying to protect them from inhaling dust, is to be x-rayed at frequent intervals, certainly not less than intervals of six months, and I am not so certain but that three months would be more safe. Certainly six months, in my opinion, would be the minimum that you should exact. If you begin to see that shadow widen, I think it is time for that individual, in spite of preventive measures in force, to get that man out. That would be my feeling.

As I say, there is still a good deal to learn about this particular problem. The question of tuberculosis is still in the air. In some of these industries the incidence is very high and in others it is amazingly low, and yet both produce the same lesions as far as pneumokoniosis is concerned. There may be some protective influence, carbon mixed up with silica, that the coal miners get. That is the general assumption. Whether that is really true or can be proved to be true, I don't know.

Discussion

QUESTION: Have any of the mines done anything to prevent dust?

DR. LANDIS: Some have. There has been rather an unfortunate situation in Pennsylvania. Through agitation in

1921, I think, the mine operators, unions, United States Public Health Association practically agreed to make an intensive survey of the situation in the anthracite mines, the cost of which would be largely borne by the operators. Then the strike of 1922 came on which threw everything out of gear and rather discouraged the operators about doing anything.

The thing was picked up again in 1924 with even better prospects. Then the devastating strike of 1925 occurred and I doubt if you can do anything in the mines now. I don't think anybody would care to agitate it. It has become more depraved than ever before because they are now using the jack hammers so extensively and the type, that is the dry type, in which the dust comes back through the tube into the man's face.

So far as I know there is no water spray and certainly the type of pneumokoniosis we see in the miners and have seen for the last six or seven years, is totally different from what it used to be. In the first place, you accomplish in five years now what it used to take 25 years to do.

QUESTION: What is the comparison between the hard and soft coal miner?

DR. LANDIS: Pancoast has examined some 500-odd films and says the soft coal miner does not produce anything as marked as the anthracite miner. He has not the rock factor to deal with. In the anthracite miner the lungs look exactly like a lump of coal and there is a certain amount of fibrosis.

A study of people who live in Pittsburgh or any city that is full of soot will show all with a mild grade of pneumokoniosis with much higher ash content than controlled lungs obtained from rural districts. So it is only when the dust gets into a very concentrated form and the higher the silicate, of course, the more difficult it is.

I don't know why it is that this country has been so backward in trying to obviate these difficulties, but it is spasmodic. The Barry study was made by a conjoint study. It was done to save the industry. The industry would have gone out of existence if it had not been for the fact they got behind it to find out where the difficulty was and put in proper preventive measures.

Connecticut is taking restrictive measures. It is a more difficult problem in a way than you can see. There are just the same interminable difficulties on the part of experts that you get in cases where there are three competent alienists who say a man is as crazy as he can be and another who says he is not crazy at all. Of course, there is no dispute about the advanced cases of pneumokoniosis.

When you get the first stages, you are faced with all sorts of difficulties, but I think that as soon as they get more effective preventive measures and make more of an effort to stop this, it would be much better for everybody concerned to meet this halfway than to have radical legislation forced.

PRESIDENT WATSON: Is it better to determine how much pneumokoniosis you can safely give people, or is it better not to have them have any at all?

DR.LANDIS: I think they had better not have any at all because the difficulty is, as I said, we have come to learn now that the old belief, that if you pulled them out it stuck where it was, is no longer tenable. Once you get it in there the tendency for this fibrosis to extend continues even after the irritant is removed. The English system uses prevention. They have compensation for pneumokoniosis and tuberculosis even where it is judged by an advisory board that a man cannot safely go on without getting more damage.

PRESIDENT WATSON: As I get the picture, the element of tuberculosis in pneumokoniosis is not a very important thing.

DR. LANDIS: It is, in the pure silica cases where the silica content is very high. I don't think there is any question about that. A good many of the potters get it. My experience has been that coal miners have it less frequently than any of the others I have had contact with, and yet in the granite cutters, I think Jarvis said about 60% of those who died, died from tuberculosis.

PRESIDENT WATSON: A great many live to a relatively good old age before they die. The feeling I have had is that tuberculosis as a terminating factor in individuals with pneumokoniosis was not terribly important.

DR. LANDIS: I think the general belief is otherwise. I suppose the Rand experience is the worst. The experience of Lanza with zinc miners was very bad.

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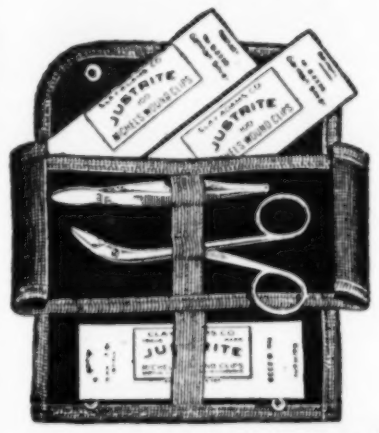

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PRESIDENT WATSON: Wasn't their average something like 45 years?

DR. LANDIS: No the average is about five to eight years in work.

DR. C. O. SAPPINGTON: I should like to get myself straightened out on the matter of etiology and terminology. As I understand it, the term pneumokoniosis is a general term referring to dust in the lung. Silicosis is also a special form? Are those cases you showed us this afternoon pure anthracosis or some silicosis?

DR. LANDIS: Those cases were a combination of both, but the worst is the silica. The South Africians, because they were dealing only with silica got into the habit of giving people the impression the only form of dust producing this difficulty was silica.

A girl working in a cigarette factory in Richmond, Virginia, who put the gilt on the packages, developed from this powder, pulverized gilt, a perfectly definite pneumokoniosis. There was not a vestige of silica in it. I think to confine these to the term "silicosis" is bad. It gives the impression that none of these other organic dusts need to be contended with. As a matter of fact, I think any one will produce damage if the exposure is heavy and long enough. Pure silica is the worst one of the lot, and the only explanation I could ever offer as to why the incidence of tuberculosis was so high in these pure silica cases was slow chronic evolution. The pure silica cases in two years will do as much damage as I have shown you there would occur in 25 years. Those are probably subacute or acute, being inflamed, and naturally offer a much more fertile field for the tubercle bacillus than

the old fibrosed lungs that are resistant to infection because tuberculosis heals by fibrosis, anyhow.

DR. SAPPINGTON: What percentage of silica occurs in anthracite coal?

DR. LANDIS: About 30%. There are some industries in which the silica content is as high as 99%.

DR. HARVEY: Has there been any attempt to determine the length of time a man can remain in granite cutting or sand blasting under present conditions with relative safety?

DR. LANDIS: That I don't know. Since they have put in the devices at Barry I think they have undoubtedly lengthened the thing tremendously. Sand blasting is a little too new. For instance, we examined these 30 or 40 of the asbestos workers who are causing so much furor now. Articles are coming out all the time. We examined asbestos workers as far back as 1916. We did not regard that as a very severe hazard. It was relatively new and the men had not been in it long enough. Now the thing is cropping up all around. Scarcely a month goes by now that somebody does not report three or five cases dotted around in various parts of the country.

This varies from the ordinary silicosis in that you get the asbestos bodies in the sputum and in the lungs, a characteristic produced by the asbestos, but the essential feature in the end, after all, is the fibrosis.

DR. R. B. CRAIN, Rochester, N. Y: Dr. Landis, you brought out the point that there is a difference in the time of development in these conditions and the sputum examination is important in diagnosis. What percentage of those cases you showed on the screen had suptum or productive cough?

DR. LANDIS: They all did.

DR. CRAIN: Is the early case apt to have a cough?

DR. LANDIS: In those extremely early cases they may have no symptoms whatever.

DR. CRAIN: What I was getting at is it seems to me the only way to follow up is to take serial x-rays in the absence of productive cough if you are going to study the development and differentiate between that and tuberculosis.

DR. LANDIS: I don't think there is any question that one of the things that ought to be done in any industry dealing with a dangerous type of inorganic dust is to subject the workers to periodic examination not less than every six months, and I am not so certain that it ought not to be done much more often.

Until the x-ray came along nobody had an idea as to how bad this thing was. Lots of those men I showed you had perfectly terrible lesions of the lungs. If you examined them you would be amazed at their personal appearance and how little you could get out of the chest. But with the knowledge of their occupation and time of exposure you can foretell pretty shrewdly the amount of damage you are going to get.

DR. R. T. LEGGE, Berkeley, Calif: Have you noticed the clubbing of fingers?

DR. LANDIS: Yes, that was especially true among potters. In most of these cases of fibrosis where the fibrosis becomes dense in that third stage, so-called, there is the clubbing of fingers. You see it not infrequently.

The Industrial Doctor
OFFICIAL JOURNAL OF THE NEW YORK STATE SOCIETY OF INDUSTRIAL MEDICINE

Published under supervision of the Ways and Means Committee of the New York State Society of Industrial Medicine. Publication office, F. E. Redmond, Managing Editor, 406 Root Building, Buffalo, N. Y. Articles appearing herein do not necessarily reflect the opinion or policy of this journal nor of the New York State Society of Industrial Medicine.

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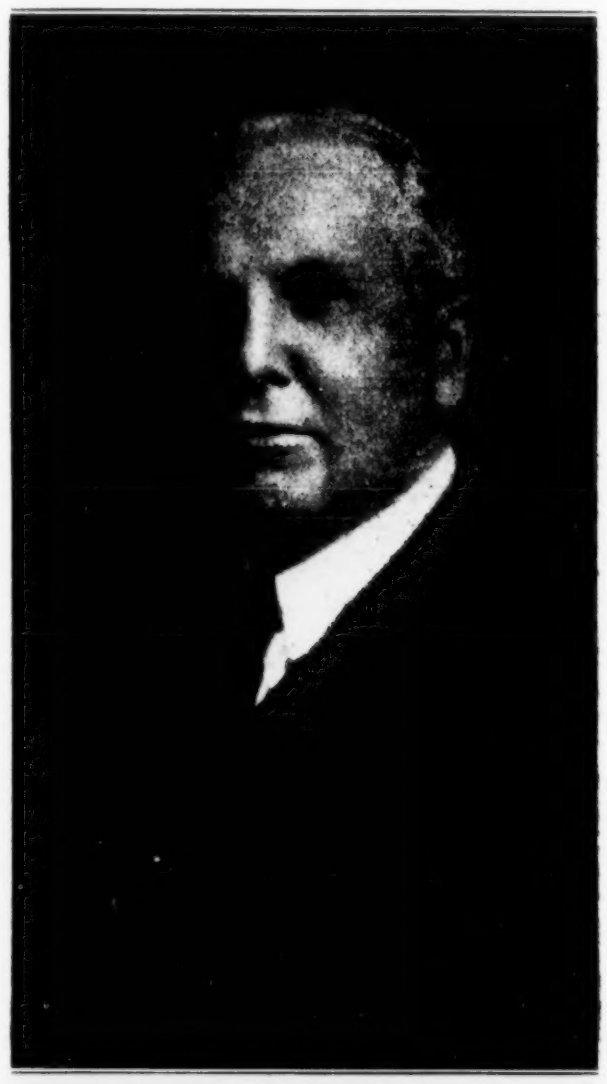
VOL. 11 NOVEMBER, 1933 No. 11

DR. PATRICK H. HOURIGAN, founder and first president of the New York State Society of Industrial Medicine, died at Buffalo, Tuesday, November 7, 1933.

He was a pioneer in industrial medicine. His early schooling was obtained at Oswego, N. Y., in the public and high schools of that city as well as Oswego Normal School. Soon after completion of school work at Oswego he removed to Buffalo where he entered the medical school of the University of Buffalo, graduating in 1893. He was president of his class. He attended post-graduate courses at Rush Medical College and the Polytechnic Institute, New York City, and returned to Buffalo to take up his practice.

Early in his medical career Doctor Hourigan became interested in industrial medicine and his interest and experience along this line gradually led to his complete absorption in this branch of the medical profession. For many years he had been medical director for Larkin Co., Inc., at Buffalo. He was a prime mover in the organization of the American Association of Industrial Doctors and, after the organization of this



P. H. HOURIGAN, M.D.

national body, recognizing the need for a state association, secured the interest of

a small group and awakened the interest of New York State physicians and surgeons who were taking up industrial medical practice. The New York State Society of Industrial Medicine was the result, and Doctor Hourigan was elected its first president.

Since that time he has been an active, ex-officio, member of the Board of Directors. Wherever constructive steps were being taken for the advancement of his profession, there you found Doctor Hourigan taking an active part in the program.

Annual Meeting

DR. RICHARD S. FARR of Syracuse, N. Y., was elected President of the New York State Society of Industrial Medicine at the twelfth annual meeting of that organization held at Rochester, N. Y., November 2, 1933, succeeding Dr. Donald C. O'Connor of Buffalo, N. Y.

Dr. Charles D. Squires of Binghamton, N. Y., was elected First Vice President; Dr. Charles W. Woodall of Schenectady, Second Vice-President; Dr. Raymond C. Almy of Auburn, Treasurer, and Frank E. Redmond of Buffalo, Executive Secretary.

The scientific session was featured by a paper on "Treatment of Elbow Fractures—Recent, and Elbow Disabilities—Ancient", by Dr. Frederic J. Cotton, M. A., M. D., F. A. C. S., Boston, Mass. and a scholarly presentation "An Evaluation of the Three Different Types of Treatment of Osteomyelitis — Chemical Sterilization, the Orr Treatment and the Maggot Treatment", by Dr. E. T. Wentworth, A. B., M. D., F. A. C. S., Rochester, N. Y., which is printed in this issue of *Industrial Medicine*.

Other papers included "The Prostate as a Toxic Factor in Trauma", by Dr. Alexander Mason, Syracuse, N. Y., and "Surgical Knots, Ligatures and Sutures", by Dr. A. R. Grant, F. A. C. S., and Dr. H. C. Lyman, Utica, N. Y.

The next meeting of the Society will be at Syracuse, N. Y., November, 1934.

Treating Chronic Osteomyelitis with Special Reference to the Use of the Larvae of Blow-flies

By EDWARD T. WENTWORTH, A. B., M. D., F. A. C. S.

Rochester, New York

THE TWO OBVIOUS factors which prevent healing of a bone abscess are bacterial infection and the presence of a foreign body in the form of dead bone. The presence of dead bone, and many other foreign bodies, in the absence of infection, does not interfere with ready healing; but, the presence of infection with a foreign body, no matter its nature practically always prevents healing.

Before discussing types of treatment of osteomyelitis, in the light of the object of treatment indicated, namely, the elimination of dead bone and bacterial infection, we will consider the natural curative process.

It is, first, infiltration of the region with phagocytes; second, enlargement of bony spaces by activity of giant cells in order to secure drainage for the dead phagocytes and bacteria; and third, large increase in the amount of local circulation for the purpose of chemical contact of blood serum with bacterial toxin in order to stimulate the development of antibodies to such toxin.

But, during this natural curative process, up to the time of establishment of drainage, the region is filled with dead bone and bacteria. The problem of chronic osteomyelitis is fully established before the acute osteomyelitis is over.

We recognize that there are probably a few cases of acute osteomyelitis which have become spontaneously cured without drainage, but from what we know of the usual situation, we are forced to conclude that in such instances the balance of power between parasite and host must have been very much in favor of the host. The bacteria must either have been killed quickly or have been greatly attenuated, because the vascular engorgement associated with an inflammatory process, inside the rigid walls of bone, blocks circulation, deprives the lacunar cells of their nutrition and results in very early necrosis of cancellous tissue.

Nature's processes alone are usually insufficient to kill bacteria before bone cells are killed, and before the dead bone becomes infilterated with bacteria.

It is recognized that bone may be dead and form the skeleton for reconstruction of bone, but it is not recognized that bone may be dead, and, at the same time, infected and form the skeleton for reconstruction, except as an involucrum, a process of substitution rather than replacement.

The condition of chronic osteomyelitis, once established, nature's next attack is one of elimination of dead bone. The organic elements of bone are destroyed by proteolytic enzymes liberated by infiltrating leucocytes. Lime salts are unaffected by such enzymes, but are partially and slowly removed by granulation tissue. The exact means is not known. It may be by production of an acid medium. Granulation tissue appears to play a greater factor in this process than osteoclasts.

GRANULATION TISSUE comparatively readily separates the dead from the living bone. It does a little toward reducing the size of the sequestrum, but rarely enough to permit its extrusion through the discharging sinus. The granulations attack both living and dead cortex, along the line of junction, from both peristead and endosteal sides, forming two, irregular tortuous grooves which are gradually deepened until they meet. But, once separated, this dead bone, if of any considerable size, will remain cornered in a pocket of living bone for an indefinite period. The longer it remains, the more hopeless becomes the chance of natural elimination, because nature's reactionary process to the presence of dead bone takes the form of increased density of the surrounding bone, thereby decreasing the circulation and making more impossible the activities of granulation tissue and phagocytes.

The function of the osteoclast[1] under conditions of local strangulation of circulation is to open up passage through bone for newly budding cappillaries; but the osteoclast, apparently, will not function upon an isolated sequestrum surrounded by infection. Foreign particles have rarely been detected in phagocytes about dead bone.

We must not lose track of the important fact, however, that it is not alone because the bone is dead that the reactive process runs in this wrong direction. If the bone were not infected the histologic picture would be the same as that around many bone lesions—osteomalacia,

* Presented at the 12th Annual Meeting, New York State Society of Industrial Medicine, Rochester, N. Y., November 2, 1933.

1. Geschickter and Copeland—"Tumors of Bone"—*American Journal of Cancer*, p. 305-306, 1931.

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giant cell tumors, scrobutus, rachitis, gout, metastases, tubercles, gummata, osteitis fibrosa, namely, new loose connective tissue, absorption of bone, enlargement of blood vessels, and formation of osteoid tissue. That process would soon result in complete healing of the bone lesion. It is because the bone is infected, as well as dead, that the reactionary process is incomplete.

In situations where the dead bone and infection are eliminated, nature seems to be able to satisfactorily heal the spaces left and although there may be some chance for discussion on[2] whether cortical bone is actually regenerated or whether medullary spaces are reformed, these are of comparatively minor practical importance. It is certainly definitely established that the bony defect is filled in first, by granulation tissue, and second, by fibrous connective tissue with a large amount of intercellular substance which develops into osteoid tissue, and finally bone.

Now, as to therapeutic procedures in eliminating dead bone and bacterial infection: there are three systems, all based upon preliminary complete surgical drainage, and by that is meant actual removal of all dead bone and exposure to the outside world of the region in which the dead bone lay. It must be recognized at the outset, that there is no such thing as perfect surgical removal of dead bone. In a few cases of chronic osteomyelitis, it is possible to neatly pick out a well-separated sequestrum without doing enough injury to living bone to produce more dead bone. Some descriptions of methods of handling osteomyelitis are based upon a few cases of this type; and the successes are due, not to the particular system advocated, but to the good fortune of readily removing the sequestrum. Usually, however, the surgical removal of dead bone entails the killing of more bone.

The three systems of treatment to be discussed are:

1. That of chemical sterilization of bone wounds;
2. A system which is currently going under the name of the Orr method, but which may be called the isolation method;
3. The maggot treatment.

FOR about 100 years, during an age of striking advances in the science of chemistry, countless attempts have been made to sterilize wounds by the application of antiseptics. All of them have proved to be failures because of the inability to reach the bacteria growing inside the host tissue. Of all of these chemical procedures, the use of Dakin's solution has had the greatest opportunity to prove its worth. Under war conditions, Dakinization was thoroughly standardized, thoroughly taught and its use required. War conditions provided a very extensive opportunity for its use under ideal conditions of full equipment and well-trained workers. But a great many cases of bone infection were not controlled. And, in spite of the gentlest and most painstaking care, many men suffered acutely from the daily dressing and pleaded constantly to be relieved from the ordeal. If the correct use of Dakin's solution gave us perfect results, it might be worth while to train someone in every hospital to properly carry out the treatment, and to struggle on with the shrieking children through the daily

2. M. M. Pomeranz "Peculiar Regeneration of Bone following Maggot Treatment"—*Radiology*, Vol. XIX, p. 212, 1932.

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dressings; but, the difficulties of satisfactorily carrying out Carrel-Dakin sterilization and the imperfect results make it a poor type of treatment for general use.

It is practically impossible for anyone who has not had opportunity to see Dakinization correctly done, as it was in the Rockefeller Institute in 1917-18[3], and actually to have worked at it day after day himself, to appreciate the many details and extreme care necessary to carry out properly this treatment. Otherwise, it is a great delusion.

Innumerable chemicals will kill bacteria if contact can be made, but we cannot make the contact. Until we can secure a chemical lethal to pyogenic organisms and harmless to the animal host when given intravenously, chemical solution of the problem seems impossible.

Largely influenced by the distress and incompleteness of the Carrel-Dakin procedure, in 1923 Doctor Orr began popularizing a phase of nature's process in handling infections, namely, isolation of the region of infection[4]. Complete surgical drainage is not peculiar to this isolation method. All systems are dependent upon a preliminary, complete surgical drainage.

Nature is beneficient in invariably attempting to isolate infections. She does it by muscle splinting and by building up phagocytic and granulation tissue walls around the invading parasites. Her beneficient purpose is to minimize pain and to protect the host against bacterial

3. Carrel and Dehelly—"The Treatment of Infected Wounds"—Paul B. Hober, 1917.

4. H. W. Orr—"Osteomyelitis and Compound Fractures"—C. V. Mosby Co., 1929.

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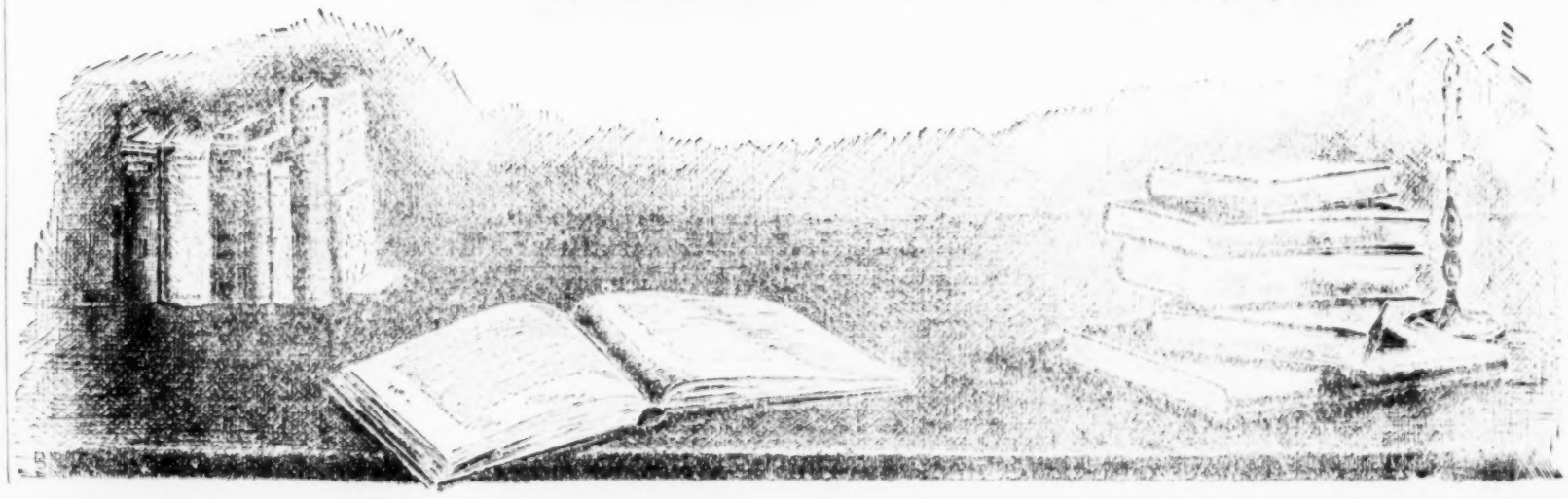

invasions. Doctor Orr's system conforms to this process. Elimination of the daily dressing and immobilization of the entire region around the wound remove from the patient's sensorium the painful and constant reminder of the presence of the lesion. Leaving wound surfaces alone and keeping them quiet by immobilization of the part, gives the phagocytes and granulation tissue the most favorable conditions under which to wall off the invading bacteria. Isolation of the wound also reduces to a minimum the possibility of reinfection.

Albee is working to prove his thesis that the beneficial agency in the Orr treatment is the bacteriophage of d'Herrelle. This intangible something[5] is still in such a controversial state that we don't know what it is. Perhaps it is an ultramicroscopic virus parasite, penetrating and destroying bacteria. Possibly it is an active principle secreted by bacteria of an aggressor strain, exercising a lytic action on a recipient strain, that is a physiologic regulative influence in bacterial life. Why not a normal, filtrable phase of bacterial cyclogeny? During their life cycle, bacteria may pass through a series of morphological and functional changes, in which cycle there is an ultra-visible sexual form, by means of which the protoplasm is rejuvenated. These are all guesses and may all be wrong. Albee[6] says that 94 of his 100 cases of osteomyelitis produced spontaneously a specific bacteriophage; that in only three was the laboratory able to add the bacteriophage; and that in the remaining three (hemolytic streptococcus infection) none could be produced. On that basis, then, the unamplified isolation treatment should be 94% efficient, even if we believe that bacteriophage is an important factor. But, there is ample reason for questioning if there is any clinical effect of bacteriophage. Its presence is readily demonstrated in wounds, but it is probably inactive in the presence of mucus, fibrin, pus, blood serum, erythrocytes and fixed tissue cells.

Critics of the isolation method indulge in controversy over whether chemical antiseptics are or are not used; over whether the splinting is done by plaster of Paris, or by splints; and over the time at which the collected discharges may be removed. These points are not of vital importance to our present consideration. The greatest contribution of the isolation method is elimination of meddlesomeness with nature's process of killing bacteria.

THE RATIONALITY of the maggot treatment lies in the ability of a living organism to consume sloughing tissue and bacteria. Farmers and veterinarians have long known of the value of maggots in wounds in animals. Recent interest in the subject has brought to light numerous references to its use in humans, both accidentally and intentionally.

Ambroise Pare[8], in writing about the battle of St. Quentin, (1557), makes considerable mention of the green and blue bellied flies and their worms in the wounds and dead bodies. However, to him their presence spelled nothing but pestilence. Larrey[9], on the other hand, in his "Memoirs" (1814) describing the French campaign in Syria in 1799, stated that the larvae of the blue flies expedited the healing of wounds by shortening the work of nature in causing the separation of sloughs. Maggots were probably first used clinically by a Confederate army surgeon, J. R. Zacharias[10]. Baer quotes him as saying, " I first used maggots to remove the decayed tissue in hospital gangrene with eminent satisfaction. I used them afterwards in various places, and I am sure I saved many lives by their use."

The late William S. Baer[11] had the wonderful courage to carry out an extensive piece of research with maggots on humans, following an observation of their effect in wounds, an observation which others had made without the imagination and courage to follow up. But, just as the criterion of the success of the Carrel-Dakin treatment does not rest with what could be done in the Rockefeller Institute under ideal wartime conditions, so the criterion of the maggot treatment cannot rest with what Doctor Baer could produce. It rests rather with what results the rest of us can produce, over long periods of time, and under less perfect conditions.

The maggot finds in an infected wound food, consisting of dead tissue and bacteria, which food he proceeds to devour, leaving only his feces to be pushed away by secretions and granulation tissue. Inasmuch as the maggot is a living organism he has a certain power to search out dead tissue which the surgeon cannot see, and to reach bacteria which the surgeon cannot touch. Ideas concerning the manner in which the larva consumes dead tissue have changed with knowledge. Baer originally stated that the maggot gnawed on dead bone; but later he realized that the process is one of sucking instead of gnawing.

Forty years ago J. H. Fabre[12] demonstrated that the mouth parts of flesh flies are adapted only to sucking their nourishment in liquid form. In 1907, Guyenat[13] showed that larvae have no apparatus for mastication. In 1922, Woolman[14] showed that the conformation of the buccal cavity and of the upper alimentary tract of the maggot is such as to permit the consumption of liquid foods only. The sensation produced by the action of the larvae, which was interpreted as gnawing, is due to two hook-like processes near the head, which are organs of fixation and locomotion.

As to the manner of preparation of solid food for ingestion by larvae, Fabre concluded that the maggot secreted a ferment externally which liquefies food for ingestion. Guyenat believed that the external digestion was done by symbiotic micrococci. Woolman has shown that sterile maggots will externally liquefy sterile protein. And, finally, Hopson[15], in 1931, has practically ruled out the possibility of a salivary enzyme, and has proven the presence of three enzymes, (tryptase, peptidase and lipase) in the

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10. J. F. Zacharias—Memoirs—Quoted by W. S. Baer in "Treatment of Chronic Osteomyelitis with the Maggott"—*Journal Bone and Joint Surgery*, Vol. XIII, p. 438 ff, 1931.

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13. S. Guyenat—L'Appareil digestif et la digestion de quelques Larves des Mouche. Bul. Scientific de la France at de la Belgique, Vol. XII, 1907.

14. Woolman—Biologie de la Mouche Domestique et des Larves de la Mouche a Viande—*Annal. de l'Inst. Pasteur*, Vol. XXXVI, 1922.

15. R. P. Hopson—"Studies on the Nutrition of the Blow-Fly Larvae"—*Journal of Experimental Biology*, Vol. VIII, 1931.

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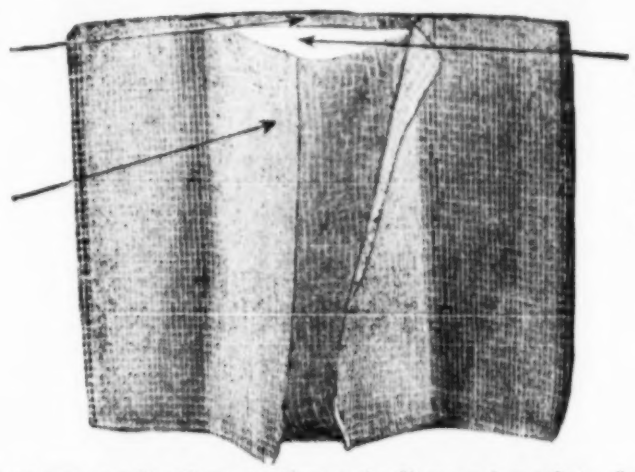

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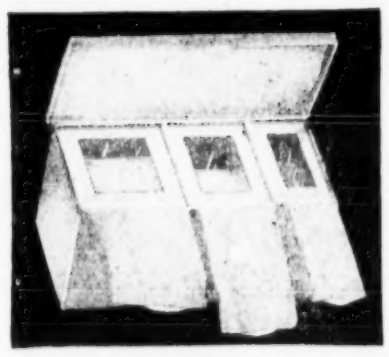

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mid-gut and persisting in the excreta. That makes possible external solution of sloughing tissue. There is still no proof, which I have been able to find, that larvae provide any ferment with a solvent action on bone. I have been forced to conclude, with other clinical workers, that there is no evidence that maggots devour bone.

As to the effect of the maggot upon bacteria in the wound, the Department of Entomology in Washington[16] has shown by careful dissection of larvae fed on infected material that, whereas the upper end of the digestive tract is full of bacteria, the number decreases until at the lower end there are none. This indicates that the larvae actually digests bacteria. Certainly, the clinical indications are that the wounds become bacteria free, as the dead tissue is removed. It might be alleged that bacteriophage plays a part in this disappearance, but Duncan[15] has made special tests for the detection of bacteriophage in the gut contents of the different arthropods, without ever finding any. Starin[18] of the Department of Bacteriology of the Ohio State University College of Medicine, has also shown that there is no demonstrable bacteriophage present in the larvae.

Other biological facts of interest and practical importance taken from Murdoch and Smart[19] are as follows: the larval stage of the blow-fly consists of two periods; first, the growing and feeding period which lasts from five to seven days. During this period the larvae eat actively and are of surgical use. The prepupal or inactive period lasts six to eight days. During this period they do not eat and are of no surgical use. The larvae breathe through spiracles situated at their posterior extremities. They require a supply of oxygen at all times. Lack of food or oxygen in deep wounds, or those filled with secretions drives the larvae out. Flies are attracted by light but larvae are repelled by light. The larvae used surgically are those which live only on dead tissue. These species are commonly known as "blow flies". They are the Lucilia sericata (green-bottle fly), Calliphora erythrocephala (blue-bottle fly) and the Phormia regina (black blow fly).

We have used only larvae from commercial laboratories. These laboratories carry out a painstaking technique in raising and sterilizing which insures a good product. The maggots are shipped in bottles cooled by ice, to hold back development.

We usually keep the larvae in a refrigerator until we plant them in a wound. Occasionally, in a case where we have had difficulty in getting growth, we have allowed them to remain at room temperature for 24 hours to develop more vigor. In such cases we always return them to the refrigerator before planting, in order to make them less active. If they are very active at the time of implantation, it is difficult to get them into the wound without getting them all over everything else in the vicinity. We usually change them at five day intervals in both children and adults. We have noticed that as they become older they are much more effec-

16. Wm. Robinson, Ph.D., Washington, D. C. —"The Use of the Blowfly Maggots in the Treatment of Osteomyelitis and certain other Diseases"—Mimeo Circular, Bureau of Entomology, U. S. Department of Agriculture. "Surgical Maggots in the Treatment of Infected Wounds; Culture of Sterile Maggots"—*Journal of Laboratory and Clinical Medicine*, Vol. XVIII, No. 4, p. 406, 1933.

17. W. Martin, and W. G. Heeks—"Maggots and Osteomyelitis"—*Annals of Surgery*—Vol. XCVI, p. 930-950, 1932.

18. E. H. Wilson, C. A. Doan, and D. F. Miller.—"The Baer Maggot Treatment of Osteomyelitis—Preliminary Report of Twenty-Six Cases"—*Journal of the American Medical Association*, Vol. XCVIII, No. 14, p. 1149, 1932.

19. F. F. Murdoch and T. L. Smart—"A Method of Producing Sterile Blowfly Larvae for Surgical Use"—*U. S. Naval Medical Bulletin*—Vol. XXIX, p. 406 ff, 1931.

tive scavengers. Occasionally they will pupate outside the wound, but it has never given us any trouble.

The use of larvae cannot be expected to, in any way, simplify the meticulous care and thoroughness necessary in preliminary operative procedures. We have never used larvae immediately following drainage of acute hematogenous osteomyelitis, thinking that the isolation method is adequate until fenestration or saucerization is done. For the most part, our cases have been those of resistant chronic forms or of badly infected compound fractures. We have used larvae twice in tuberculous bone lesions, secondarily infected, but do not recommend it. The pyogenic secondary infection can be cleaned up, but the probability is that later the tuberculous lesion will again cause a break-down of the tissues. We have used larvae on dead bone without sequestrectomy, without any worth-while improvement. Twice, a Welch bacillus infection has responded promptly to applications of larvae. We do not know that closure of wounds, following the use of larvae, will be any more permanent than following other methods of treatment. In fact, we doubt if it will. We have had three cases suppurate for a short time, eight months to a year after closure. None has required other treatment than simple incision for drainage.

Some difficulties accompany the use of larvae. It is sometimes difficult to keep the depth of wounds uncovered by muscles. A bronze coffer dam, made of a flexible retractor, and strapped into the wound has helped temporarily. Larvae will not work down in small dark sinuses. There is usually a profuse serous drainage which drowns the larvae if it is not either repeatedly aspirated or allowed to run out by gravity. The sensation of pain from the clinging and crawling of the larvae is undoubtedly very objectionable to some adults—those who have not formed mental habits of thinking about something besides their bodily sensations. The maggot works by night as well as by day and keeps such people awake. It is certainly much easier to distract the child's mind. He is more readily interested in his environment by day, and nothing keeps him awake when he is sleepy. In some cases we have had considerable skin excoriation alongside the wounds, under the rubber walls of the cages. This has never caused interference with recovery, but has produced some discomfort.

Baer stated that after a few implantations he recovered decreasing numbers of larvae and that, at the end of the fifth implantation, his maggots often did not live at all. His observation led him to think that there was some ,beneficial, biochemical, antibacterial substance produced in the wound, by virtue of the presence of the maggots, and that possibly this substance could be isolated and used alone. Livingston and Prince[20], carrying on Baer's idea, state that death occurs after the fifth implantation, because the hydrogen ion concentration of the wound has increased, and because some substance has been produced through contact of the live maggots with the tissues, which so increases in virulence, that in time the maggots are killed by its potency. They also state, as Baer hypothecated that this substance is a curative agent. As yet, nothing definite has been proven regarding such a substance.

We have never recovered anything like the original 1000 larvae at the end of the first implantation, even when there has been an abundance of food for them. Probably 300 living larvae, at the end of five days, is our maximum. Usually we don't have more than 100 living after two or three days. But, we have had vigorous growth following the twelfth implantation. Other workers have reported a similar experience. The record, as far as I have heard, is 56 successful growths in one wound. We continue implantations until the granulation tissue of the wound is at skin level, or until it is evident that further operative treatment is necessary. It has seemed to us that the successful living of the larvae has been dependent upon the amount and character of the food provided in the wound. As the food, consisting of dead tissue and bacteria, decreases, the larvae decrease in number and size.

Several series of implantations of larvae have been made in the same individual. Each set grew vigorously in new wounds, after previous sets had died out in healing wounds. That would indicate a local rather than systemic cause of the death of the larvae.

It is necessary to remove the cage completely at the time of changing the larvae. We have found Unna's paste (zinc oxide 2½ parts, gelatin 6¼ parts, glycerin and water each 19 parts), the best medium for fastening the cages to the skin[21]. We tried and discarded gauze to replace the copper screen. If the cloth mesh is fine enough to keep the larvae in, it soon become sealed by secretions.

THERE IS ONE PHASE of the maggot treatment which does not seem to be consistent with the previously stated conviction that one of the best things we can do for infected wounds is to leave the surfaces undisturbed. The action of the larvae upon the wound surface would seem to be one of constant irrritation. When they become very vigorous and active the temperature of the patient often rises. Statistically this has occurred in one-third of the implantations. It occurs, in the average, on the third day, and amounts to an average rise of 2.9°. This occurrence has not been more noticeable in children than in adults. But, do larvae irritate wound surfaces? Their action on the surface is merely locomotion and sucking. They never produce any hemorrhage on delicate granulation tissue. We interpret the temperature rise as the result of increased absorption of bacterial toxin through a growing surface of granulation tissue exposed to wound secretions. Buchman[22] has interpreted it as the result of opening of chronically infected lymphatics. Livingston and Prince[20] have reported a similar reaction following the application of filtered, uncontaminated extracts from the bodies of crushed larvae without the use of living maggots. Weil[23] thinks that any system of complete drainage of secretions will eliminate this temperature elevation.

Our experience has been obtained from 28 lesions in 20 individuals. Twenty lesions healed in a 61 day average, with an average of six implantations per lesion. Three of these were badly infected, compound fractures. Two were post-operative bone infections of long standing. Fifteen were cases of hematogenous osteomyelitis previously operated and treated by other methods. Of the eight which have not healed, three are still under

20. S. K. Livingston and L. H. Prince—"The Treatment of Chronic Osteomyelitis with Special Reference to the Use of the Maggot Active Principle" *Journal of the American Medical Association* Vol. XCVIII, No. 14, 1932. "Maggots in the Treatment of Chronic Osteomyelitis, Infected Wounds and Compound Fractures"—*Surgery, Gynecology and Obstetrics*, Vol. LIV, 702-6, 1932.

21. E. L. Jewett—"The Use of Unna's Paste in the Maggot Treatment of Osteomyelitis" —*Journal Bone and Joint Surgery*, Vol. XV, p. 513, 1933.

22. Joseph Buchman and J. E. Blair—"Maggots and Their Use in the Treatment of Chronic Osteomyelitis"—*Surgery, Gynecology and Obstetrics*, Vol. LV, No. 2, p. 177 ff, 1932.

23. G. G. Weil, S. Nettrour, R. Rohm—"Treatment of Acute Hematogenous Osteomyelitis with Especial Reference to the Use of Maggots"—*Pennsylvania Medical Journal*, Vol. XXXIV, p. 313, 1931.

G. C. Weil, R. J. Simon and W. R. Sweadner, —"Larvae or Maggot Therapy in the Treatment of Acute and Chronic Pyogenic Infections"—*American Journal of Surgery*, Vol. XIX, p. 36-48, 1933.

treatment. Three were carried out under circumstances which would naturally throw them out of a statistical report; (a) tuberculosis of the hip; (b) extensive neuro-trophic ulcerations of the foot; (c) large area of exposed dead cortex of a tibia, in a congenital luetic who refused sequestrectomy. Nine implantations made no advance upon this dead bone. One of the cases was a rather extensive involvement of ilium and ischium which had been operated upon three times previously. After two implantations it was not possible to keep the wound open for effective implantation. This case healed spontaneously in six months. The other failure was in a man 65 years of age. He was given 17 implantations, after a complete saucerization of bone in the upper tibia, but granulation tissue grew rapidly and continued to harbor infection in spite of two thorough currettings.

We are not using the system exclusively. We still feel that as perfect surgical drainage as possible, and leaving the wound surfaces seriously and painstakingly untouched is often the best system of handling bone infections. But, we do seem to be cutting down the period of hospitalization in refractory cases; and we are certainly getting a type of scar more satisfactory to the patient.

The results of other workers reporting are tabulated as follows.

Baer[14] (Baltimore) — 89 cases — 50 healed; 28 improved; 11 unimproved; statistics on period of treatment not given completely.

Wilson, Doan and Miller[18] (Columbus, O.)—26 cases—22 cured; average period of healing, 10 weeks.

Livingston and Prince[20] (Hines, Ill.) —100 cases—95% cured; second series of 100 cases using active principle, vaccines, and in some instances maggots in early stages—88% cured; period of treatment six weeks to six months.

Buchman and Blair[38] (Hospital for Joint Diseases, New York City) — no statistics given, but favorable report on experience.

McClellan[24] (Montreal)—Nine cases —two cured; three incomplete at time of report; two inadequate treatment; two died.

Child and Edwards[25] (Port Jefferson, N. Y.)—10 cases; eight healed; eight to 30 implantations used; period of treatment eight weeks to six months.

Weil, Simon and Sweadner[23] (Pittsburg)—28 cases, but no time period on healing reported; four acute hematogenous—two, three, five and seven implantations; six chronic, multiple sinuses —eight— 51 implantations—three not healed, one died; 18 componud fractures —no statistics on healing.

CARREL - DAKINIZATION has proven altogether too complicated a process of chemistry and wound dressing for general use. In its present state of devolution—the result of time and practice—it is not only uncertain in combating infection, but also dangerous in inviting secondary infection. And, done well or poorly, it is unnecessarily uncomfortable to the patient.

The isolation treatment is inexpensive, the simplest to handle and the most nearly fool-proof. Its chief disadvantage is the disagreeable odor from accumulating secretions.

The maggot treatment is much simpler to handle than Dakinization. It is odorless. It is very effective. It results in more level and lesss disfiguring scars than other methods. Experience indicates a shortening in the healing period.

24. N. W. McClelland—"The Maggot Treatment of Osteomyelitis"—*Canadian Medical Association Journal*, Vol. XXVII, No. 3., p. 256 ff, 1932.

25. F. S. Child and E. F. Roberts.—"Treatment of Chronic Osteomyelitis with Live Maggots"—*New York State Journal of Medicine*—Vol. XXXI, No. 15, p. 937 ff, 1931.

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The Influence of Parathyroid on Traumatic Conditions*

By Dr. Don Deal and
Dr. G. W. Stabens
Springfield, Illinois

THE PARATHYROIDS at the present time are exciting an exceptional amount of interest. We know definitely that they control the calcium metabolism in the skeletal system. Roentgenologically and histopathologically, the similarity of fibrocystic diseases, pagets disease, bone cysts osteochondritis juvinalis, giant cell tumors and many other forms of begnigned osseous conditions are very similar in many respects. The histopathologic picture of many of these conditions is difficult to differentiate. It has long been suspected that these conditions might be associated both as to etiology and course.

In a review of the microscopic appearance of 300 cases of giant cell tumors studied at the Mayo Clinic, Moore has become convinced that giant cell tumors are not true neoplasms. In many cases these tumors showed a condition that was impossible to differentiate from Osteitis fibrosa cystica and bone cysts. We know that repeated injections of parathormone will produce decalcification of the bones, multiple cystic degeneration and other changes such as are found in parathyroidism. The chief symptoms of parathyroidism are an elevation of serum calcium, a decrease in serum phosphorus and an increase in calcium and phosphorus excretion in the urine and feces larger than the intake, and therefore a negative calcium and phosphorus balance. Ballin states that hypercalcemia may be temporarily or continuously absent and if so, should not exclude the diagnosis of parathyroidism if all other symptoms are present. The calcium determination should be repeated many times before coming to an accurate conclusion.

This excessive excretion of calcium and phosphorus is taken from the skeleton and therefore late retrogressive changes in the form of osteoporosis and osteitis fibrosa cystica take place. Whether or not pagets disease, giant cell tumor and the other bone diseases mentioned should be included in the parathyroid group should furnish abundant opportunity for speculation and study.

Many investigators are of the opinion that osteitis fibrosa systica or Von Recklinghausen's disease is the only osseous disease associated with parathyroid disorder. They base their opinion on the fact that the disease is of endocrine origin and therefore the entire skeleton should be effected. They further state that the elevation in serum calcium is permanent and not transitory as stated by Ballin.

Max Ballin, Detroit, classifies parathyroid disorders as follows:

1. Vertebral type in which the early symptoms are back leg ache. As the disease progresses pain increases and the x-ray shows an apparent Hyphosis with a wedging of the vertebra and pathological compression fracture of the vertebral bodies. This type may be important from an industrial standpoint.

2. Infantile type, which begins more rapidly with general intestinal and urinary disturbances followed by skeletal pains and deformity. The x-ray shows general decalcification, cyst formation and giant cell tumor. Multiple fractures frequently occur.

3. Arthritic type with pain, weakness and stiffness of the joints, and demineralization of the spine, long bones and skull.

4. Paget type. There is much dispute as to whether osteitis fibrosa cystica and osteitis deformans are two different entities or not. Pathologically, microscopically and clinically, transitory stages from one to the other are found.

Ballin emphatically states that the results of Parathyroidectomy in Paget's disease confirms the opinion that the two diseases are identical and can be controlled by parathyroidectomy. This includes the monostatic as well as the more general type. Here again there is a difference of opinion, the contention being that in Paget's disease the changes are frequently confined to one bone, that the bones are soft with a thickened cortex while in Parathyroidism the cortex is thin with cystic degeneration.

5. A type where the muscular hypotonia or gastro-intestinal symptoms are more prominent than the skeletal. In this type the weakness of the movements of these patients resembles a pseudohypertrophy of the muscles.

In many of these cases a thorough study of the muscular reaction and of the blood chemistry will lead to the right diagnosis. Several methods may be sued in diagnosing muscular hypotonia.

By determining the number of milleamperes necessary to provoke muscular contraction. A normal muscle responds to four milleamperes. Weakened muscles require many more milleamperes.

By determination of the chronoxia, that is, consideration of the time factor of the muscular contraction.

PROBABLY the most important is the electrocardiograph. This shows that the muscular weakness effects the heart muscles and is demonstrated by a shortening of the R. T. interval. The normal R. T. interval is about .26 second, while in parathyroidism an R. T. interval of .22 second or less is usually found.

Usually the changes in the parathyroid gland are those of a tumor. Some have been considered a simple hyertrophy of the gland, others benigned adenomata and a few malignant adenomata.

It is very probable that the malignant type originate from a previous benigned adenoma as the long duration of the osseous changes over a period of five to seven years would speak against pri-

* Read before Central States Society of Industrial Medicine and Surgery, Peoria, May 16, 1933.

mary malignancy. The diagnosis of a parathyroid tumor is very difficult due to the deep-seated location of these bodies. The tumor must be of considerable size before it can be palpated. For this reason a persistent hypercalcemia accompanied by serious osseous changes is justification for an exploratory operation.

The treatment of parathyroiditis consists of the surgical removal of the gland or irradiation. A collar incision as is used for goiter operations should be made to insure wide exposure. Both sides should be inspected before removing any tissue to be sure if a tumor is present.

When identifying the parathyroid bodies it should be borne in mind that there are usually four present. Two located near the lower pole with a small branch of the inferior thyroid artery leading to them and two near the center of the lobe. The location and number of the bodies is not always constant and in a small percent of cases the glands are found buried within the thyroid gland. They are of a yellowish brown color oval in shape and about five to seven millimeters long.

Care should be used in their removal because of the close proximity of the recurrent laryngeal nerve.

Tetany occasionally develops following but is usually only temporary and indicates a disturbance of parathyroid function during a period of readjustment. Parathormone, 20 units daily, for about a week may be necessary to counteract this complication. The intravenous administration of calcium may also be resorted to in these cases.

Discussion

DR. L. M. HILT, Springfield: The first case shown is one of Paget's disease and there is some osteoporosis in the skull. The books and literature tell us that Paget's disease usually unites; in fact always does with an excess of callus formation. Here is one case that did not.- It is definitely a case of Paget's disease which has been treated with x-ray and who now feels much better. It is said that we are liable to cause hyperthyroidism by treating these parathyroid cases. That is not correct, because we treat them practically the same as we treat hyperthyroid cases. There is no danger from that standpoint. When these patients refuse operation, x-ray treatment is indicated.

In the second case I did not have the opportunity to make the first examination. On the second examination I made the diagnosis of parathyroidism and there was a good deal of argument about it. The film was sent to Dr. Moore of St. Louis who said it was parathyroidism. Dr. Evans of Detroit saw the film and said it was a typical case of parathyroidism.

One must be careful in making the diagnosis of parathyroidism and not make it carelessly. All the bones should be examined. In one spine case we x-rayed the skeleton and there were no changes in all of the bones. Some people say there should be changes in all the bones. That is not true.

Another thing about the blood chemistry. Blood calcium may be normal part of the time so that we have begun to diregard this in making the diagnosis provided the bones show x-ray changes.

Industrial Medicine News

Occupational Disease Experience in Ohio During 1932

AN ANALYSIS of occupational disease claims filed with the State Industrial Commission in 1932 has been made by the Division of Safety and Hygiene of the State Department of Industrial Relations.

A comparison of the figures for 1931 and 1932 shows that in 1931 the total number of claims filed was 1,240 with 1,108 being filed for compensable conditions and 132 for conditions other than those listed in the occupational disease law. In 1932 the total number of claims filed was 1,135 with 984 being filed for compensable conditions and 151 for non-compensable diseases. It is evident, therefore, that there were 105 less claims filed in 1932 and when claims for compensable conditions are considered, the total number was 124 less than for 1931. In the comparison this last figure, namely 124, is considered as being a better index of the real reduction in occupational diseases, for there was an increase in the number of claims filed for non-compensable diseases which usually include tuberculosis, bronchitis, asthma, arthritis, neuritis, heart conditions and a number of various diseases which are not occupational in origin and should not be considered as developing from industry.

In considering the 984 claims for compensable diseases it is found that 648 were due to some skin disease. Of this number 561 were for dermatitis, which is an inflammatory condition of the skin. These were divided as follows: 25 were attributed to the handling of oils; 63 to cutting compounds or lubricants; 253 to dust; 205 to liquids; 13 to fumes; two to gases or vapors. One case of epithelioma or skin cancer was attributed to the handling of carbon. Eighty-six cases were described as chromium ulceration of the skin or nasal passages. This chromium ulceration is a recent addition to the occupational disease law, which became effective July 8, 1931. Prior to that date ulceration of the nasal passages, even though due to the action of chromium acid, could not be considered as coming within the provisions of the law. During 1932 there were 70 cases of nasal ulceration filed.

With a few exceptions the period of disability resulting from skin diseases is short as compared with some of the other industrial diseases; the total number of days lost for the 648 claims totaling 8,254 days. For the cases of dermatitis the total number of days lost was 7,673 for a total of 561 claims, making an average of 13.6 days per claim.

Under the classification of industrial poisons, 174 claims were filed with a total of 61,226 days lost. In this group lead poisoning is the most prominent cause of disability. During the year there were 138 claims filed for lead poisoning with six fatalities or death claims. Investigation of the files shows that none of these death claims has as yet been allowed as compensable by the commission. Four have been definitely disallowed due to the fact that in each instance death was found to be due to some condition other than lead poisoning and in the other cases the proof has not been completed sufficiently for the claims to be presented for decision. Exclusive of the six death claims it is found that the average period of disability in the cases of lead poisoning filed was 35 days per claim.

Other claims filed for industrial poisonings are as follows; brass of zinc five, with one death; mercury two; phosphorus two; arsenic two; benzol or derivatives 13, with carbon bisulphide two; wood alcohol one; carbon dioxide one; volatile petroleum products four; sulphur dioxide one.

From the above it is evident that the industrial poisonings, while fewer in number than the skin diseases, are responsible for a much greater loss of time. Excluding the nine deaths which are filed in this group, it is found that the average period of disability is about 100 days per claim as compared with 13.6 days per claim for dermatitis.

In July, 1931, tenosynovitis and prepatellar bursitis were added to the list of compensable conditions and during the year 142 claims were filed for these conditions, 120 for tenosynovitis and 22 for prepatellar bursitis.

Examination of Automobile Drivers

THE OCTOBER letter of the Paris correspondent of the American Medical Association relates especially to the activities of various French bodies concerning the examination of automobile drivers.

A convention was held in Paris, during the annual automobile show, to consider the problems affecting the "safety of the highways." In addition to discussions about automobile brakes, modes of illumination, signals and road signs, an entire section was devoted to discussing the medical examination of drivers of automobiles. Numerous accidents are, no doubt, due to the bad physical condition of the drivers manifested in such ways as poor vision or hearing, dizziness due to circulatory disorders, epilepsy, nervous disorders or alcoholism. As far back as 1923, the Academy of Medicine demanded that persons affected with serious organic defects not be permitted to drive an automobile. That resolution had no direct effect. Mr. Andre Tardieu, during the period that he served as minister of public works, was asked, in 1927, on the floor of parliament, by a member of the chamber of deputies, whether it was not possible to require a medical certificate attesting to the competence of every person who drives an automobile. At that time there were more than 300,000 automobile drivers, and Mr. Tardieu said that such an examination, although desirable, was practically impossible. He emphasized that if the requirement should be made retroactive it would take several years and necessitate the mobilization of more competent experts than the country could furnish. It was decided therefore to subject to examination only such persons as became involved in automobile accidents, the purpose being to discover whether they were suffering from any physical defect that would render their driving dangerous. The permit to drive was withdrawn from persons who had driven while in a state of intoxication, as established by the decree of 1928. In June, 1930, the Academy of Medicine renewed its demands. Acting on a report of Dr. Claude, it demanded that every automobilist on whom any penalty whatever is imposed, even though only because of having exceeded the speed limit, be required to submit to a mental examination.

As of August 1, 1930, the minister of public works, who has charge of everything pertaining to the highways, decided that a medical examination should be required of all persons requesting a permit to drive large public vehicles, the examination to be given by one of a group of physicians designated by the prefect of the department. In 1931 the Academy of Medicine requested that this examination be construed to include drivers of all vehicles carrying more than eight persons, and that it be renewed every two years for public corporations and every year for private enterprises. In Paris, the prefecture of police imposes a rigorous examination on all drivers of auto-busses, the certificate based on such examination being subject to renewal periodically. The results have been excellent, for the Paris Autobus Companu, since the introduction of these regulations, has observed that accidents caused by its vehicles have diminshed by 16% and that, in indemnities paid to victims, it has saved 1,500,000 francs ($90,000). The drivers of taxis have not yet been made subject to this examination, but demands are heard on all sides that the examination should include them. Of 36 taxicab drivers subjected to an examination by Dr. Toulouse, at the Psychiatric Institute of the Hospital Ste. Anne, after having become involved in accidents, 10 were found to be affected with dementia paralytica, 12 with psychasthemia associated with impulses and obsessions, two with alcoholic dementia, two with epilepsy, two with toxicomania, four with alcoholism, and three with dementia praecox.

CUMULATIVE INDEX

Index of *Industrial Medicine* for:
Vol. 2—No. 1, July, 1933, pp. 1 to 84
No. 2, August, 1933, pp. 85 to 144
No. 3, September, 1933, pp. 145 to 204
No. 4, October, 1933, pp. 205 to 272

Agriculture Accidents, by Edward L. Lloyd 240
Anthrax, by Henry F. Smyth, M.D., Dr. P.H. 42
Application of Bio-Chemistry to Industrial Disease Prevention, The, by May R. Mayers, M.A., M.D. 32
Asphyxia (The Industrial Doctor) 132
Beer and the Worker, by Max Trumper, Ph.D. 231
Better Functional Results in Treating Certain Common Fractures, by Drs. Don Deal and G. W. Stabens (Cen. States Soc. I.M.S.) 263
Business Recovery, Health and, by Hart Ellis Fisher, M.D., F.A.C.S. 166
Cadmium Poisoning 181
Cardiovascular Disease and Industry, by Nathan Smith Davis, III, A.B., M.D., F.A.C.P. 229
Clinical Classification of Post-traumatic Mental Reactions, by Alfred Solomon M.D. (Cen. States Soc. I.M.S.) 72
Clinical Research in State Compensation Bureaus, by Leopold Brahdy, M.D. 12
"Compensable Back," by John D. Ellis, S.B., M.D., F.A.C.S. 152
Electrical Accidents, by Hart Ellis Fisher, M.D., F.A.C.S. 205
Following up Physical Defects, by Rufus B. Crain, M.D. 98
Fundamentals of Asphyxia, by Yandell Henderson, Ph.D. 132
Goal for Industrial Hygiene, by Dean K. Brundage 175
Health Activities, by Leverett D. Bristol, M.D., Dr. P.H. 85
Health and Business Recovery, by Hart Ellis Fisher, M.D., F.A.C.S. 166
Health Hazards and Insurance Carriers, by C. O. Sappington, M.D., Dr. P.H. 24
Industrial Commission and the Industrial Surgeon, The, by William Scanlon (Cen. States Soc. I.M.S.) 195
Industrial Health Programs, by A. W. Schoenleber, M.D. 243
Industrial Hygiene 234
Industrial Medicine 225
Industrial Physician and His Part in the Safety Program, The, by J. Newton Shirley, M.D. (The Industrial Doctor) 68
Infant Death with Special Reference to Asphyxia, by Dr. Shirley W. Wynne. 135
Maggot Treatment of Osteomyelitis, by Dr. G. W. Stabens (Cen. States Soc. I.M.S.) 265
Malpractice Insurance, by I. S. Trostler, M.D., F.A.C.R., F.A.C.P. 108
Marble Bone Disease, by J. W. Connell, M.D. (Cen. States Soc. I.M.S.) . 270
Medical Costs in Industry, by J. A. Turner, M.D. 14
Medical Relation and Compensation .. 101
Medicolegal Cases 111
Methylene Blue Treatment, by Roy W. Kelly 51
Occupational Diseases 18
Occupations of Antiquity, by Robert Legge, M.D., F.A.C.S. 145
One Hundred Books for the Doctor ... 172
Preventive Medicine in Industry, by J. A. Britton, M.D. 1
Principles and Applications of Differential Pressures, by Dr. Pol. N. Coryllos 132
Rehabilitation of Trauma Cases, by A. M. Harvey, M.S. M.D., F.A.C.S.. 249
Silicates and Silicatosis, by Carey P. McCord, M.D. 4
Traumatic Chest Diseases, by Hermon Harrison Cole (Cen. States Soc. I.M.S.) 133
Traumatic Surgery of the Eye, by Paul G. Moore, M.D., F.A.C.S. 35
Vocational Rehabilitation, by John A. Kratz 177